

# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

DEC. 19, 1949

*Birmingham*

*turns on L-M High Intensity Lights*

*on all three runways*

With the Mayor as official host to federal, state, and local authorities, nearly ten thousand people attended the dedication of the new L-M High Intensity Lighting installation at Birmingham, Alabama Municipal Airport.

Lights are the latest controllable beam type, with up to 180,000 beam candlepower—more than any other runway unit now known. They are approved

under CAA specification L-818. Airline captains report seeing them from 70 miles away. Their ability to penetrate Birmingham's frequent smogs should substantially increase airport traffic. For full information on lighting for large or small airports, ask the L-M Field Engineer, or write Line Material, Airport Lighting Division, East Stroudsburg, Pennsylvania.



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The XF88... Air Force fighter... is the latest to join the ranks of McDonnell jet planes for the U.S. armed forces. Like an four-engine... the McDonnell F4U-3, "Phantom", the F2H "Buccaroo", and the XF85 "Goblin"... the XF88 is powered by Westinghouse Turbojet Engines.

We are honored to supply the power plants for these outstanding new planes... welcome addition to the rapidly growing family of Westinghouse-powered planes for the U.S. military service.

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GAS TURBINES**



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*"Chloromonobromomethane?"*



*"Bromochloromethane?"*

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— and **Kidde** is the place to get it!

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Kidde studies show that C-B is at least equal to methyl bromide in extinguishing ability, and is considerably less corrosive. Consequent authorities expect considerably lower toxicity.

For a fuller summary of Kidde work on C-B, write for a copy of "Research in Aircraft Fire Protection."

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# Ryan Aeronautical Company presents

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Michael Balch, Airplane Service Manager (center) and Charles J. Thomson, Customer Service Supervisor stand by one Ryan Novion as geared up — with Texaco, of course.



Ryan Aeronautical products, Airbikes and services the famous Texaco personnel and business plane. Texaco Aviation Lubricants and Fuels are used exclusively.



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Coming in at Lindbergh Field, San Diego, service-wise Ryan took over to the Ryan Novion. Attention there are "on their own" to give fast, efficient service. Facilities for maintenance work of all kinds are open. The best in aviation lubricants and fuels are available. Ryan has handled Texaco exclusively for many years.

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*More revenue airline miles in the  
U. S. are flown with Texaco Aircraft  
Engines than with any other brand.*

Let a Texaco Aviation Representative show you how you can increase your business with Texaco's complete line of aviation products. Just call the nearest of the more than 2900 Texaco Wholesale Distributing Plants in the 48 States, or write The Texaco Company, Aviation Division, 135 East 42nd Street, New York 17, N. Y.



## TEXACO Lubricants and Fuels

FOR THE AVIATION INDUSTRY

TEXACO STAR THEATRE presents AIRCRAFT MADE IN AMERICA every Tuesday night. MIDWINTER GAMES broadcasts every Saturday afternoon.

## New Planes in the News . . .



**MARTIN:** P3M-1 has been awarded initial production contract by the Navy for an amphibious bomber. The craft is intended for amphibious warfare, but can also be

utilized as a cargo or general utility plane. Gull wings, tall single tail and long alouche are distinguishing features. Powered by two Wright R-1500s, the P3M will have a crew of seven.



**PIASECKI:** HO4S model stretch wings interior layout permitting carrying 12 standard AF or Marine troops, all of which can be loaded in flight. The craft is designed

for Arctic areas of limited snow. Fitted with seats, the HO4S can carry 12 fully equipped troops. Craft is fitted with 480-hp. P&W R-1540 engine, but can also take Wright R-1190 or R-1120.



**SARGENT AND GREENWAY:** S-60 will be Britain's largest commercial flying boat. The model shows craft's basic design but any. First is to be powered by two Bristol Perseus turboprops, with eight engines

mounted in pairs to two side-by-side contra-rotating props. Two engines will be mounted separately outboard of the main installations. Design gross weight is 507,000 lb.

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# 1 Tail Actuator with Fibre and Transmitter

Designed for installation in the leading edge where it can serve as main balance. 22800 BACKLASH at output shaft permits opening rib with simple lock, so obtain varying mechanical advantage increasing with load.

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Incorporating our electronic control equipment to obtain programming or positioning, collect from any type of signal for automatic operation or for manual control indicating indicators.

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Standardised bevel gear drive for use in rubber material, or power operated systems. Anti-friction bearings and hardened steel 300 inch pounds ultimate. Pressured steel on mounting and output.



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## AVIATION CALENDAR

Jan. 9-10—Annual meeting and Engineering display, Society of Automotive Engineers Hotel Kaul-Godwin, Detroit.

Jan. 16-27—Fourth annual Air Transporters Institute, conducted by American Transports in cooperation with CAA and AEA, Washington, D. C.

Jan. 15-15—All American Air Museum at Dayton, Ohio.

Jan. 16-17—Miami-Havana Air Cruise to Florida Air Plant, Miami.

Jan. 16-19—First Montclair Show sponsored by Montclair Society of Automotive Engineers and the South for the Advancement of Management, Cleveland, Montclair, Ohio.

Jan. 17-25th annual dinner of the Traffic Club of Philadelphia, Emerson-Park Hotel, Philadelphia.

Jan. 17-18—Twentieth annual annual air show, Cactus Space Operation school, Udonia, Ill.

Jan. 19-19 annual Human Night dinner, Hotel Astor, New York, N. Y.

Jan. 21-26-44th annual meeting, both annual and Hotel Astor, New York, N. Y.

Jan. 24-North American ICAD Council Meeting.

Feb. 15-16—National Sportsman's Show, Civic Center, Chicago.

Feb. 17-Mile 1-Bronx meeting, American Society for Testing Materials, Hotel Wald, New York, N. Y.

Mar. 6-10—75th annual meeting, American Road Builders' Assn., Northbrook Hotel, Chicago.

Mar. 16-18—annual flight propulsion meeting sponsored by the American Society of Automotive Engineers, Cedar Hill, Cleveland.

Mar. 18-18—National Flight Exposition, sponsored by Society of the Pioneer Industries, New York, Chicago.

Apr. 4-4—Engineering and Maintenance Assn. (AIAA), New York, N. Y.

Apr. 4-4—National Production Exposition, sponsored by the American Society for Testing Materials, Hotel Wald, Chicago.

Apr. 16-16—annual business meeting, American Society of Airport Executives, New Haven Hotel, Columbus, Ohio.

Apr. 17-17—1950 acoustic meeting, Society of Automotive Engineers, Hotel Bristol, New York, N. Y.

May 14-14—Western conference on Road America and the national meeting of the American Road Builders' Assn. held in San Francisco, University of Illinois, Urbana.

June 1939-1939 annual meeting, American Society for Testing Materials, held in hotel of testing apparatus and related equipment, Chalmers-Holmes Hall, New York, N. Y.

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## NEWS DIGEST

### DOMESTIC

Wright Aeronautical Corp. has received two military engine orders worth \$12,250,000 for three types of Cyclone engines. Larger order, nearly 200 engines, is from Navy for 2700 hp Cyclone 16-R-8150-20W and 3750 hp Cyclone 16-R-8150-20W engines, for use in the AD and PTW series at each, and partial plans respectively. Second order, from USAF, is for an unspecified number of 1425 hp Cyclone 16-R-8150-20W engines for the C-47A. The first order totals nearly \$12,250,000.

Mitac Air Force Base has been ordered Edwards Air Force Base in honor of Capt. Glenn W. Edwards, killed in the crash of an experimental 14-49 Flying Wing on June 19, 1948. Also named: Silverport Quartermaster Detachment, Air Force Depot, known May 21 Stewart, Jr., killed over Japan.

Capital Airlines DC-3 crashed into the Potomac River while making an ILS approach to Washington National Airport. Pilot, captain and two passengers were killed, and 19 persons were injured. Pittsburgh an scheduled domestic airline accident this year now number 91 passengers and 11 crew personnel. A California Arrow Airways DC-3 crashed and burned near Vallejo, Calif., today. All were seriously injured. Accident occurred about three miles from airport during a maneuver.

Part of New York Authority last week closed Newark Airport to lighter-type aircraft traffic following a similar move by the Authority at LaGuardia and New York International Airports (American Wings, Nos. 235, Referred to as not apply to P-47, A-1 and B-24 which, according to the Port Authority, the New Jersey National Guard "needs on operating" under terms of a 90-day lease at Newark, signed in 1923.

Personal aircraft shipments during October by sea companies totaled 235, including 165 from planes and 45 two planes according to the Personal Aircraft Council of AIA. Total dollar value was \$948,300. According to statistics by 10 companies the previous month of 263 aircraft valued at \$2,156,800. Total 1949 shipments through Detroit number 1106 aircraft valued at \$1,668,000.

Under a new policy adopted by the Army, Navy and Air Force, stamps given at military installations may be used to private citizens for emergency use when adequate commercial space is not available, and when it is not well

not interfere with military operations. Racial charges, according to the Department of Defense, will be based on reasonable commercial rates in the area.

Civil Aeronautics Board has set Jan. 9 as the tentative date for a hearing in application to provide helicopter service in the New York City metropolitan area (Aviation Week Nov. 7). Hearing was originally set for Dec. 5. Seven applications are involved: Air Corporation, New York Helicopter Corp., New York Aerial Inc., Air Industries, Inc., International Aerial, Inc., and Ashby Park New York, Vermont Corp. Site of the hearing, according to CAA will "most likely" be at Washington.

Civil Aeronautics Board last week initiated public hearings in Dallas, Tex., to determine the cause of the American Airlines DC-6 crash at Love Field.

### FINANCIAL

Consolidated Aircraft Corp. for the fiscal year ended Sept. 30, 1949, reported net income of \$117,738,413, of \$6,350,170, from aircraft sales and \$6,175,000 from sale of non-aerospace products. Net earnings for the period totaled \$299,046.

Roll Aircraft Corp. reported a profit of \$49,245 for the nine months ending Sept. 30, 1949. Sales and income during the period totaled \$1,154,153. Roll showed a net loss of \$107,331 for the same period in 1948.

### INTERNATIONAL

A DC-3 operated by Roll, crashed near San Paulo, Brazil, killing 10. It was the first fatal accident for the Brazilian carrier.

Germany is applying American military personnel at traffic control operations at four airfields in the U. S. Zone of Germany. British and French will continue to be operated by military personnel.

Vesp Aircraft Brazil airline has purchased five Cessna 440s from Vesp. Consolidated Vesp, the first Brazilian carrier to use the aircraft Vesp, which has only under Board recently acquired Aerovias Brasil, which has routes to the U. S.

Belgium has been licensed by Rolls-Royce to manufacture Daimler-Benz jet engines. Fokker has already been licensed to manufacture the Gloster Meteor IV airplane in now the Royal Air Force will be able to make the complete fighter discussion instead of drawing an British stocks.



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# New U.S. Aircraft Engine

**Navy sponsors most powerful propeller-type engine  
ever cleared for flight!**

A new American aircraft engine—the most advanced type in the world—is now developed by the U.S. Navy. It's the new Allison XT45 turbo-prop which develops more horsepower per pound of weight, with good fuel economy, than any propeller-type engine ever built by any nation. The engine currently is rated at 2500 horsepower.

The new Allison turbo-prop will enable any propeller-driven aircraft—for the military services or commercial airlines—to fly faster and carry increased pay loads over longer distances on higher altitudes.

The outstanding performance is accomplished through the engine's high power, small size and light weight. Yet, fuel economy comparable to the best present-day conventional engines is retained.

Moreover—to weight ratio, including extensive shifting and reduction gear, it double that of our best present-day reciprocating engines—actually more than two horsepower per pound of engine weight.

The new Allison XT45, combining of two super-powered gas turbines, achieves these important results through high-compression ratio and the flexibility of the twin power plant.

By supercharging reciprocating engines now in use, this new turbo-prop engine likewise is highly valuable substitute for the turbo-prop engine which powers today's very high speed military airplanes. Both these turbo-type engines are the same low-gear, readily available fuel; they do not need high-octane aviation gasoline.

The ease and flexibility of installation of this type engine are demonstrated by its first application in the Navy XHT-9 Convair flying boat. Designers can utilize this compact, most powerful engine in all types of aircraft—in both military and commercial—to gain increased range and performance.

Once more Allison, a world leader in aircraft engine development and production, has made an outstanding contribution to help keep America first in the air.



ALLISON XT45  
TURBO-PROP

Contains the most use of this engine, developing 2500 horsepower, with the power-propeller above.

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INDIANAPOLIS, INDIANA



Builder of the famous C-55 and C-56 turbo-prop aircraft engines

## WHO'S WHERE

### Changes

**New Appointments—Local.** Engineering Corp. has named Milton A. Key chief engineer, with headquarters at the company's plant in Deltona, Fla. He was formerly chief engineer for the Miami Electric industrial division. J. McIlwain Smith is the new assistant to W. A. Pittman, president of United Air Lines, successor to W. S. Dore, now American Airlines, of Cincinnati. He will be based in Washington. Asaiah E. Kinsinger and Montague C. Co. has succeeded Carl J. Cline director of research. Robert J. Smith, Jr., is with McKinsey & Co. as a marketing consultant. He was a research fellow at Harvard School of Business Administration, where he worked on "Airline Competition."

Robert M. Paul, a consulting engineer with Lehigh Valley & Associates, Ltd. and Vice President, Allen Martin has been appointed Assistant Secretary General for Air Navigation of the International Civil Aviation Organization. He is currently a member of the Canadian Air Transport Board. W. G. McDowell has been appointed technical director manager for Pacific Airframe Corp.

**John Blanton-Dan M. Parker** is new general sales manager for Piper Aircraft Corp. William Latham is general sales manager at E. M. Hollenbeck Corp., Houston-Texas. Walter Shuman, Co. has made three sales shifts. F. E. Lewis, formerly Chief District Engineer, is now manager of electrical sales. Moving J. Hall has become manager of conveyor after, Irving A. Gensel is assistant manager of new sales, William G. Gensel is now in the Cleveland office. Gordon E. Lyons has been named sales rep at Dayton.

**Paul H. Fenn-Mrs. Margaret Kerr** has been appointed manager of public relations for Northern Airlines in Washington. Previously, she had been a special NFA rep in New York and Boston. **Ernest-Gladys Sherry**, vice president and assistant to the publisher of American Aviation Publications, has resigned. He had been a company officer since 1947, and was chairman of the editorial board until July 15, when he became publisher's assistant.

**Edmund-Robert** Wilson, General, director of purchases and traffic for Champion Spark Plug Co.'s engine division, returns the end of the month.

### Elections and Honors

Aviation Chemical Co. elected Robert G. Hood president, engineer, Los Angeles, F. James Reed, sales and publicity, New York. **Paulo Antonelli**, Corp. elected two new members of its board of directors. Lemmer H. Cooper, Jr. and general manager, and J. O. Gennet, treasurer and controller.

Dr. Nicholas P. Hall, professor of aeronautical engineering at Stanford University, has received the medal of the Society of Engineers, the first aeronautical research to get the award in 1950.

## INDUSTRY OBSERVER

**Canada Pacific Airlines** has purchased two de Havilland Comet turbojet transports, bringing the total now to eight up to 18. CPA paid the equivalent of about \$1,200,000 apiece for its two Comets. The airline plans to use them on its trans-Pacific routes from Vancouver to Australia. CPA is now authorized to make a leasing stop at San Francisco on its route to Hawaii.

Several airlines are interested in a 107-passenger jet coach version of the Boeing Stratoliner. By depending with various fields demanded by airlines for delivery Stratoliner, Boeing could offer the jet coach version at a lower price. Pan American Airways is still interested in three Stratoliner jet coach versions despite CAA's continued showing on such proposals.

**Eastern Airlines** is conducting field experiments with the Glenn L. Martin Co. for a substantial number of revised model 3-0-2 transports. The new version of the 3-0-2 will be specially tailored to meet Eastern's needs. It will be powered, add 19 inches to the fuselage, permitting four main seats, and will be powered by a new model Pratt & Whitney R-2800 engines. The new version will be revised, using oil-type wing fuel tanks added for increased range and the craft will have a slightly heavier gross weight than the 39,000 lb. now authorized for the Northwest Airlines version of the 3-0-2. Eastern plans to use about 10 of the new model 3-0-2s to replace its 51 DC-6s now in operation.

**Night fighter version** of the British Electric EEC-3 Canberra two-man light bomber is under development with production on both bomber and night fighter versions expected to start early in 1952. The Canberra is powered with two 7500 lb. Rolls Royce Avon turbojets and has great fuel capacity, and remarkable maneuverability. It is based upon the de Havilland D. H. 115 night fighter Vampire prototype, on account of range.

**Two new 155-lb. pushers** in the Goodyear-Continental outboard plane category are now flying and one of them may make its debut at the Continental meet at Miami. One is the PAR Scout, developed at St. Louis by George A. Owl and other Par Air College alumni working at McDonnell Aircraft Corp. Place made a dead stick landing without difficulty above a power failure on its first flight. The other is the Saboteur (Roberts, N. Y.) Dragontail, with "Mikometer" design, 740 horsepower shaft to propeller belted tail, bicycle landing gear, variable fuel tank bottom of fuselage, and other refinements. Saboteur has been released after a mishap on takeoff for second flight but still, and is expected to fly at Miami.

**General Electric's** current two D-20 laboratory planes at Salsbury, N. Y. are the 40th and 41st of that type that GE has used on tests from the USAF. One tests the new 3-16 instrument system, and the other is a flying test bed for the GE J-47 turbojet engine mounted through the bomb bay.

**Trane Engineering & Manufacturing Co.** is converting an Army cargo C-54 to a 46-passenger airliner for Colson Airlines, at a cost of approximately \$200,000. Delivery is expected early in 1950. Conversion includes complete overhaul and seating of all integral fuel tanks.

**Fairy Aviation Co.** is using a new construction method on its British Model 17 outboard plane with Douglas Maule, project. New method involves putting together the outside skin of the airplane in coverage job before inside structure is fitted in, reversing usual procedure of attaching skin last, after structure is completed. Easy design unexcelled accuracy of construction and complete interchangeability of parts under new method, expects to use it in all subsequent types.

**Pan American Airways** has decided to equip its fleet of 14 Lockheed 949 Constellation with Stratoliner outboard engines. Funds for the purchase have been included in the airline's new budget, although order has not definitely been placed yet with PAA. Plans to convert all of Stratoliner outboard engines in 1949 Constellation (old work on Air France), and it was partly on the basis of PAA's experience that American Airlines bought Stratoliner for its Constellation (AVIATION WEEK, Nov. 21). Eastern Air Lines and TWA are understood to be specifying Stratoliner Maule as new twin-engine planes they buy.

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Vol. 50, No. 25

AVIATION  
WEEK

Dec. 19, 1949

Plane Type	President's Budget (48 Groups)	Minimum Program (After Johnson cut)	Interim Program
Bomb B-47	75	75	82
Casual B-36	51	47	54
Lockheed F-94	178	121	133
Northrop F-89	55	27	27
Republic F-84E	0	0	120
North American F-84A	180	150	111
North American F-66D	0	0	132
Douglas C-124A	54	50	50
Bombing C-97A	22	14	14
Northrop C-119	69	51	51
Northrop C-125B	25	0	0
Lockheed T-33	100	80	*135
North American T-28	125	84	125
Casual T-29	30	12	12
Fairchild T-31	130	0	0
Comman SM-46	30	11	11
<b>Total</b>	<b>1335</b>	<b>515</b>	<b>*1070</b>

\* 30 for U. S. Navy

## Three Steps in Plane Buying

Officers' board to draw up third and perhaps final revise of 1950 AF aircraft procurement schedule.

U. S. Air Force Service Officers Board will meet shortly to draw up a final aircraft procurement schedule for fiscal 1950. The program now in preparation will be the third major revision of the schedule planned for fiscal 1950 aircraft procurement.

Previous program  
• The President's budget program presented to Congress last January calling for \$1.4 billion for buying 1155 new aircraft plus a small quantity of helicopters. This is commonly known as the 48-group program.

• The USAF minimum program (Aviation Week, Dec. 17) based on cuts below the President's budget ordered by Defense Secretary Louis A. Johnson as part of his widely advertised economy program in the National Military Establishment. This minimum program authorized \$1.1 billion for aircraft procurement—a cut of \$300 million and 520 planes below the 48-group program. Manufacturers included in this program program were to submit to locate planning their 1950 and 1951 production schedules.

• The USAF interim program which, until mid-December, represented USAF plans for its first five buying schedule out of fiscal 1950 funds. This called for maintaining about 51 billion in fiscal 1950 procurement funds for 1973 new aircraft including 10 Lockheed T-33 trainers which were to be purchased for the Navy.

New interim program has been abandoned and a new program is being drawn that will supplant, according to USAF sources, "substantial changes" from the interim program listed in column three of the adjoining table. The new program will not include any eventual disposition of about \$500 million in additional procurement funds voted by Congress but unexpended by the President to hold USAF to a maximum strength of 48 combat group plus 11 support squadrons.

• 32 Modern Group—However indications are that if USAF is held to the \$1.1 billion procurement schedule imposed by Johnson it will actually get sufficient new aircraft to equip only 31 groups with modern, post-war plans, and that the remaining 14 groups will be operated with World War II aircraft types.

The original Air Force program (approved by Congress in fiscal 1949 and 1950 called for a total of 67 combat groups of which 48 would be modernized and 19 equipped with surplus Boeing B-29 bombers, North American F-52S night fighters and Douglas C-54 transporters. Among the new models that are likely to figure in the revised procurement schedule to be introduced by the Service Officers Board are:  
• Convair B-54F. This model will be built in both bomber and strategic reconnaissance versions. Most forecast will be the use of a new type Pratt & Whitney Y67 engine scheduled to deliver a maximum of over 4000 hp.  
• North American F-100D. This is an all-weather fighter version of the basic F-80 design. It has an automatic search radar in the nose with engine air intake below the nose intake. It is powered by a General Electric J47 turbojet.  
• North American F-91. This is a precision fighter version of the basic F-80 design and was formerly called the F-86C. It has a pointed nose and flush engine air intake on the horizon. It is powered by a Pratt & Whitney F4H turbojet. Prototypes of both the F-91 and F-91A are scheduled to fly before the end of December.

• Lockheed F-94B. This is a new version of the Lockheed F-94 night fighter series and is powered by a Pratt & Whitney J-45 turbojet. Prototype is now flying.

• Release Delivered—USAF had planned to announce the final program in a press release but disclosure of the release was delayed by the National Military Establishment Public Relations Director William F. Wright's co-ordinated release on USAF, Navy and Army plans for a program called for military. New objects strongly to releasing any form of aircraft procurement information for fiscal 1950 and NMIC officials were unable to agree as to the type of procurement information to be released.

There will be no official release of USAF fiscal 1950 procurement plans until after the Service Officers Board submits its recommendations to Gen. H. H. "Hap" Arnold, USAF chief of staff. Present Board members include Gen. M. S. Fitch, chief of staff; Gen. L. G. K. Wells, deputy for materiel; Gen. G. B. Bennett, Chief of the Air Materiel Command; and Gen. L. G. Lewis, Northrop deputy for operations.

# CAA Plans Simplified Certification

CAA's proposal gives personal plane manufacturers this choice: Certify the craft yourself, or let us do it.

By Alexander McElroy

A new CAA plan for personal aircraft manufacturers seeking to assume the responsibility of certifying their own aircraft has been approved by CAA Administrator Del Kestel. It is expected to be put in force very soon.

The plan, developed as a common sense compromise between one of the most serious problems of the manufacturer of small aircraft—which has been a mix spot for years in CAA industry offices—the place where two divergent views

• A manufacturer can apply to CAA for delegation of authority to certify his own new aircraft, and if accepted as qualified and responsible, can do his own certification.

• Manufacturer who do not wish to assume the responsibility can continue certifying their new models under CAA supervision, as at the present time.

The new arrangement is limited to manufacturers of aircraft in a class weighing less than 5000 lb and carrying five passengers or less. A manufacturer who is eligible to take advantage of the alternate plan must have previously successfully designed and obtained a CAA type certificate for an aircraft in the class and must also have produced a new engine of the type under a CAA production certificate.

Warranty Policy—A company which gets CAA approval to do its own certifi-

cation is then authorized to do its own engineering design and investigation of its airplane types. And when it wants to CAA that the type design complies with Civil Air Regulation Part 3 governing personal aircraft requirements, and with published interpretations of that part which have mandatory force, CAA will issue a type certificate.

Following this, when the manufacturer wants to CAA that he has fulfilled all the requirements for a production certificate for this type of plane, CAA will issue a production certificate to him for the production of the plane, or add the type to his existing production certificate.

• **Unfinished Policy.** A manufacturer who puts this authorization in request to maintain an up-to-date technical file, covering the type certificate, if the manufacturer goes out of business the file is to be turned over to CAA which will then assume engineering supervision of any service difficulties.

If certification by CAA of any service difficulties indicates that the airplane controlled by a manufacturer does not conform to the requirements as submitted, and the non-compliance is serious, the manufacturer's certification privileges under the new plan will be withdrawn, until he re-establishes his eligibility. CAA may take action before CAA to revoke his type and production certificates.

Manufacturer is expected to make

available to CAA on request for inspection, his technical data, aircraft equipment, plant facilities, and procedures on which he has operated, under this plan.

• **Washington Review.** The CAA Aircraft Division, Office of Aircraft Safety, in Washington, is charged with reviewing manufacturers' applications to qualify under the new plan, and when a number of type and production certificates and any non-compliance directives necessary relating to types of airplanes included in the new plan. These matters will be handled "through the appropriate regional office" under direction of the Washington office.

• **Questions Raised.** Proposed to let the maker of an airplane back up his own most as development with his own industry has been the subject of much good and bad between CAA and various segments of industry. Recently it boiled down to such questions as whether CAA should delegate a single individual as a company, or the company as a whole to do the certification.

The two aviation advisory groups of 1947, the Federal Aviation Council and the Commercial Air Policy Board, recommended in substance that the personal plane sector be given more lenient T-P Weight endorsement of Standard in administration, advocated certification by industry but was unable to get an agreement among the manufacturers as to whether they would accept it or not.

The new plan will let qualified manufacturers stand behind their own products. Those manufacturers who aren't confident to go on the new production certificate will get the full CAA service type certification.

• **Small Builders.** Effect of the new arrangement on the major established companies who want to use it will doubtless be beneficial. How it will work out with the small corporations who are developing less complex aircraft is not so clearly apparent.

Last summer the Helio Corp., builder of the school bus-like helicopter prototype designed by Paul Otto Kopp of Massachusetts Institute of Technology, made a decision to shelve the two-place Helioplane as a result of failure to agree with CAA on certification procedures for the airplane.

• **Expensive Problems.** Similarly, Robert E. Fulton, builder of the radical Amphion combination automobile and airplane, was reported as having serious difficulties in his CAA certification. Because he had not demonstrated part of the stress analysis program as a conventional aircraft, he had to do it all over with a stress plane strip.

The much talked of personal plane to get into mass production, the two-seat approved Amphion, had its share of certification problems in its experimental days. Fred Week's policy of taking his problems directly to the top level of CAA administration, created a number of other difficulties.

• **Regulation Reform.** A variety of views are found on how much further reform of current regulations for small airplanes should go.

John T. Griffin, president of the Massachusetts Aviation Trades Assn., actually urged that Civil Air Regulation Part 1 "which forces and hampers on producing aircraft should be immediately thrown out the window. Instead, CAA should issue a certificate based solely upon the airplane's ability to flight to meet minimum size, weight and performance characteristics, including the ability to withstand five gusts and other structure flight test provisions in flight."

• **Engineer's View.** On the other hand many competent aircraft engineers will contend that any procedure to permit an airplane solely by flight test, is in the most expensive way of proving its performance, and that stress analysis, static tests, etc., constitute vital information which is difficult, as is now very expensive to derive from flight testing alone.

Griffin charged, in a paper read at the NATA meeting in New Orleans, that the hesitancy of existing regulations and certification procedures was making it possible for CAA to move into the field of authorization of the personal plane industry. He cited the single-seat plane prototype being developed by Tom A. & M. College, licensed by CAA and the Department of Defense, as an example of government competition with private enterprise.

He pointed to a proposed aircraft



In the new act of a Lockheed T-33 USAF jet trainer, Air Force Secretary W. Stuart Symington recently flew Washington

## SECRETARY TAKES A BACK SEAT

to New York is less than 30 minutes. First was Col. David Salinger, who flew from New York to the Atlantic.

plane development of the Helio Corp., which was to have been introduced in the fall of 1949, prior to building a larger production model in 1950, as a plane adversely affected by construction of the government-financed plane project.

• **NASAD Report.** Chester Snow, Massachusetts aviation director, also apparently expressed by the Helioplane difficulties, made a report as chairman of the research and development committee of the National Assn. of State Aviation Officials, urging that group to recommend issuance of CAA authority to personal airplane design, to remove the "costly stranglehold upon the otherwise successful project."

A program recommended by the "T-P" Weight administration calls for changing existing CAA Parts 1 and

4 to eliminate the personal aircraft category from each, and establishment of a new Part 5 which would redefine the personal aircraft category, giving the administrator authority to adopt a specification prepared by individual groups, which would represent low level use experience and set a limited amount of flight testing as needed for issuance of a type certificate.

• **"Not Demise."** A recommendation has been made to Administrator Kestel by his staff, that reviving CAA applicable to personal aircraft does not appear "too desirable at the present time."

Another recommendation from the Personal Aircraft Council of Aircraft Industries Assn. calls for a new regulation applicable to aircraft under 5000 lb., to be removed as a separate category.

## AIA Sets New Prototype Policy

It asks that existing U. S. agency administrator plan to buy first models of turbine and cargo planes.

Principal U. S. aircraft manufacturers have agreed upon the need for "government action to justify U. S. leadership in air transportation."

Previous industry differences of opinion on the question of government financing of gas turbine-powered aircraft merged into an apparent addendum to the statement by D. W. C. Roney, Aircraft Industry Assn. president, following the AIA board of directors meeting at Santa Barbara, Calif.

• **Aircraft Manufacturers.** would prefer to continue to deal directly with the air line operators in the purchase of both prototype and production aircraft. However in view of the cost of developing turbine-powered engines and cargo

aircraft, estimated at many millions of dollars, this does not seem to be particularly practical.

• **Government.** the industry needs to see a program of purchasing prototype types of advanced type aircraft. We feel that such a program should be administered by the existing government agency.

• **The Roney statement called for:**

• Means to facilitate the sale of the aircraft to the prototype as developed.

• Making available to new designers by the U. S. government, additional technical data concerning turbine engine and civil craft.

• Experimental operations within the country of turbine-powered military aircraft converted for cargo and mail.



New flight plans of the Corsair XP-12A, first U. S. delta wing plane to take the air, shows the revised to use below the wing and the delta wing seen each wing to

NEW VIEW OF FUTURE  
present quarter flow of air. The XP-12A is being used to gather data for design of a new delta wing aircraft by General Douglas Aircraft Co. also has a delta wing

lighter design (XP-12C) in the air for the Navy. Many experts believe that the delta wing configuration is the most promising for supersonic fighter-type aircraft.



Hot Discussion-Reno's statement was significant as a crystallization of airline industry sentiment on a question which has been subject of hot discussion by individual companies and its industry-wide policy committees.

It was significant also as an indication that the former Navy admiral who now heads AIA is beginning to take a more formal leadership of the association. It was known that he was exerting strong pressure to get industry agreement on its position prior to the reconvening of Congress in January.

New Recommendations-Apparatus in getting up a new government agency to handle the prototype space/civil, aircraft general aviation agencies that a new bureaucracy such as proposed in some of the legislation in the last session could be less satisfactory than to have the program handled by existing military agencies, or if that fails, by civil agencies.

LaBelle, Colby, Conrad president and chairman of the West Coast Aircraft Manufacturers and I. S. McDaniel, president of the company bearing his name and East Coast Aircraft Manufacturers, were elected successors of the board of governors.

Board, Chicago-Other changes in board of governors membership.

D. W. R. Morgan, vice president, aircraft gas turbine division, Wright Jones Electric Corp., was added to the board.

C. C. Pearson, president, Glenn E. Martin Co., replaced Harry T. Rowland, former executive vice president of the Martin Co.

Ray T. Hickey, president, Carlin Wright Corp., replaced Robert E. Earle, Carlin Wright vice president.

Richard S. Baucke, president, Fairchild, replaced R. Appleby, Jr., president, J. Clinton Ward, former Fairchild board chairman.

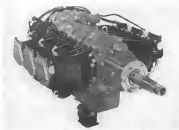
Walter H. Berke, president of Berke Aircraft Corp., replaced C. J. Kopp, president of Continental Vidian Corp., as helicopter manufacturers' representative on the board as a result of his second term as president of AIA's Personal Aircraft Council.

## PAA Sells Connies

An Finner has produced four Lockheed L-249 Conquestors from Pan American Airways, buying the design for the engine's test of 1946 in 19.

PAA had purchased the Conquestors in July 1947, as interim until pending delivery of its Stratoliner fleet. Boeing is now finishing up its order of 20 Stratoliners for PAA.

The Finner has some modifications on the craft, including installation of Carlin's propellers in upper Hamilton Struts, which are currently being used.



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REDUCTION GEAR which steps down 3400 crankshaft rpm to 2300 propeller rpm.

## Geared Engine for Lightplanes

Construction of a four-cylinder engine crankshaft and a drive turning propeller, long used in transport type aircraft and a helicopter, is coming rapidly into the small engine field with three principal manufacturers in the small engine market preparing engines fitted with a reduction gear to keep down propeller rpm.

Lycoming-Spencer division, AVCO Manufacturing Corp., Wilkes-Barre, Pa., is first in the field, with its GD-415 motor ground engine, developing 230 hp at 2400 rpm with 1400 rpm on the crankshaft and 1350 rpm on the pro-

peller. Lycoming also has geared engines in four, six, and eight-cylinder models ranging from 160 to 400 hp. Continental Motors Corp., New Lebanon, is developing a reduction gear version of the widely used R-650 six-cylinder engine, to be clearly recognizable with the Lycoming propeller when it goes into production.

Continental Motors, Syracuse, N. Y., has a geared engine version under development at the 600 cc. in engine capacity developed by the Republic Motor, expected to produce 210 to 275 hp at slow propeller speeds.

The new Lycoming production engine going into the new Beechcraft Bonanza, and the Ryan Super Navion (Aviation Week, Nov. 26), are developed from the wartime Lycoming GD-415 engine which produced 190 hp without reduction gear. It was used to power the Stratoliner L-5 transport planes, nearly 5000 of which were produced by Army Air Forces in World War II, and some of which are still in service.

First use of a reduction gear on the engine was on some Navy GD-415s developed for use in target drone planes built by the Naval Aircraft Factory, Philadelphia.

The production GD-415 for civilian use has CAA Type Certificate No. 234.

Three major advantages of the geared engine over direct drive engines are pointed out by S. B. Wilgus, Lycoming-Spencer manager:

- Increased propeller efficiency at lower speeds
- Increased power and engine efficiency
- Reduced noise level of the propeller.

The Lycoming engine is being produced in two models, GD-415A1, with intermediate-type accessories, and the more expensive GD-415C1 with aircraft type accessories. The C1 version is fitted with the A1 accessories and an A1 true cylinder design and governor.

The minimum takeoff rating of 268 hp is for two min. duration. Normal continuous power rating is 240 hp at 2400 shaft rpm.

Propeller diameter is 77.125. Other specifications: bore, 4.1 in.; stroke 3.1 in.; displacement, 451 cc.; compression ratio, 7.5:1; fuel 90/95 aviation gas; weight, 44 lb., with starter and governor; 468 lb., without starter and governor; 471 lb. overall length of the C1 model is 79.57 in.; overall length of the A1 is 49.71 in.

## Convertiplane

Its success depends on using blades as both rotors and propellers.

PHILADELPHIA—Growing acceptance of the convertiplane as a practical aircraft was in strong evidence here at the First Convertiplane Aircraft Congress, sponsored jointly by the Philadelphia sections of the Institute of the Aeronautical Sciences and American Helicopter Society.

The all-day session featured technical discussion of the convertiplane problem and presented successful preliminary solutions. The meeting was arranged and conducted by Dr. Boris Wilford, former gliderboard professor and a leading advocate of the convertiplane aircraft.

## Navy Asks Bids On Constitution

The Navy's two 180-propeller Lockheed Constitution transport planes have been officially offered to commercial interests (Aviation Week, Dec. 11).

Bids for foreign lease on the 82-ton craft are being solicited from scheduled and large non-scheduled airlines by the Navy's Bureau of Aeronautics. Navy has said the planes are "transmissional cargo and passenger mail." The Military Air Transport Service, which led first call on the Constitution, said it had no part in the sale.

Budget-Cut-Reduced military budgets do not prevent continued operation of the Constitutions by the Navy. If the planes cannot be leased they will be stored at Philadelphia, Pa.

Any commercial carrier leasing the Constitution will have to arrange with CAA to reinforce the planes for civilian passenger use.

Advantages—Basically an aircraft which can vertically as a helicopter, and has horizontally as a conventional fixed-wing aircraft, the convertiplane allows addition to the inherent speed limitations of the helicopter. Engines at the engine house, speeds of greater than 400 mph. for the type, although others believe its best speed range lies in the 150-170 mph. bracket.

Normal configuration of the new type was said by the speakers, ranging from conventional aircraft with auxiliary rotors for vertical flight, to helicopters which fold over 90 deg. in flight and operate their rotors in propeller mode. Basic design problems of the latter remain the obtaining of satisfactory efficiency from blades used both as propeller and rotor.

Interim Type—Dr. E. Helman, who believes that an immediate "interim" type consisting of a conventional helicopter with small fixed wings would satisfy the need enough to permit much higher speeds in level flight without the necessity for more extensive De Anza Planes, known to be in service and now lead of his own company in the U. S., suggests the solution to non-vertical aircraft at other moments at the end of boom attached to the wings.

His arrangement would place the rotor downwind ahead of the aircraft fuselage. In level flight its two blades would be aligned with the boom to create minimum drag. He

also proposes the use of a nacelle port on the helicopter portion of the flight, since that would require only a few seconds and thereby maintain the efficiency of the rotor.

Dr. Helman—Lloyd Leonard gave a true convertiplane with rotors mounted below the cabin, possible concept or perhaps rotor power, and said as assurance of the rotor to a propeller by rolling the airplane through 90 deg. Charles Zimmerman, creator of the Vought "Flying Pancake," favors further development of this concept into design because of its inherent ability to fly vertically or horizontally at will.

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Robert Kohn, president of King Aircraft, CAA Region I, also stated that the success of the convertiplane as a solution to the present personal flying machine largely on its ability to make flying more actual than the average citizen.

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## Dutch Rebuilds

(McGraw-Hill World News)

AMSTERDAM—After considerable discussion, the Dutch government has recommended its decision of a few weeks ago not to grant support to an independent Dutch aircraft industry (Aviation Week, Nov. 21) it has now decided to grant such support in behalf of the development of a Dutch type aircraft.

As a result of this change of mind, Fokker Aircraft Co., which already has bid to design the first new construction aircraft in the world, will be given help. The government disband of 230 employees at the construction department has therefore now been withdrawn. It is expected that Fokker will concentrate on construction of a jet engine aircraft.

## FINANCIAL

### CAB vs. Air Carrier Certificate

New trans-Atlantic policy seen undermining franchises and setting precedent that could boomerang.

The value of an airline certificate of public convenience and necessity has been placed in doubt by recent Civil Aeronautics Board action. The Board announced a policy welcoming applications from certificated and large commuter carriers to conduct special trans-Atlantic service from June 1 to Sept. 30, 1993.

Considerable air to Europe next year, this Board move serves to undermine the franchise quality advanced to guarantee stability among the certificated airlines.

One of the main virtues of the Civil Aeronautics Act of 1938, designed to end the chaotic regulatory process previously existing, was the uniformity of certification of public convenience and necessity to be used to air carrier permitting the transportation of persons, mail and property.

Franchise, "Voke"-type franchises represent a legal "right-of-way" in the sky and set the backbone of an ordered development of the nation's airline network as well as routes to foreign countries. Railroads, buses, truck companies and other public utilities, all operating under some regulatory franchise, have shown varying degrees of contrasting progress and growth. The absence of this system of franchise would allow three groups to encroach: major with consequent damage to the public and private enterprise.

In a recent five backpass that the Board's recent action must be viewed. Franchise holders can see air traffic to Europe next year will be unusually heavy because of the Civilian Aeronautics Test, necessary development in various European countries and continuing demand for travel resulting from the unsettled postwar period.

This atmosphere attracts persons for special charter and various replacement flight agencies regardless of existing law. Transcontinental & Western Air, Inc. is the only certificated U.S. air carrier with an authorized direct route to Rome.

TWA's Development-At considerable effort and expense, TWA has attempted to develop a strong, efficient international airline network, in accordance with its certificate. Toward this development, substantial U.S. govern-

ment assistance, in the form of mail compensation, has also been granted. The airline has been successful in the 1950 traffic potentialities to Rome and has devoted an extensive promotional effort toward this end. TWA ordered additional equipment and facilities to serve the heavy travel demands of next year.

A real danger now exists that if an uncontrolled number of charter flights are entered to compete with TWA, a decline of traffic may be as great as its recent increase in strength.

TWA has no monopoly in authorized service to Rome. Both Air France and KLM also serve Rome in their route patterns originating from New York. American Overseas Airlines and Pan American Airways seek key European permits where connecting lines fly to Italy.

The first recent deviation in the uncontrolled trans-Atlantic air picture is likely to come from the proposed charter service to be operated by Pan American in association with Felix Rome, a travel agency formed in Italy last year. Under this program, Pan American would operate eight round trips a month between the United States and Rome during 1993.

FAA to Board-The CAB action, of course, stands in line with Pan American by underscoring its regular trans-Atlantic revenue by direct special charter flights. However, this recent approach may cause the licensing of special Pan American. For example, Pan American's Latin American operations have been very profitable and have been susceptible to peak traffic demands. The time may come when another U.S. carrier may decide that in order to meet peak conditions it has assigned a series of charter flights to implement the authorized Pan American service. Once the security of a certificate of public convenience and necessity is regarded in one instance, it takes very little effort to make further stretch elsewhere.

Even greater damage can be involved in the Board's open invitation to virtually all air carrier to run charter flights to Rome during the peak traffic period from June 1, 1993 to Sept. 30, 1993. During this interim, Pan American has indicated that it would like to use its charter trip daily to Rome. Presumably,

these charter trips would be negotiated by other carriers to an unlimited degree. All such applications must be filed before May 1, 1993.

Board Decision-In a vigorous dissent, CAB member Harold A. Jones, highlighted the danger in the current Board policy (see page 61).

The question is asked: "For who would travel to Europe in the winter time at special rates if they can travel in the summer time at even lower special rates?" In out-pole terms, the CAB member depicts the Board majority's contention that these group outlets will not be subdivided. The focus must be the diversion of the summer traffic will eventually come out of the public purse, according to Mr. Jones. Further, considerable doubt is cast upon the legality of the so-called exemption authorizing the charter flights.

As present regulations do not permit any carrier to carry passengers between nations, Mr. Jones questions the Board's ability to authorize such carriage by administrative act.

In support of his position, the dissenting Board member declared: "A travel agency selecting and booking passengers on international travel is no different carrier and as such a carrier engaged in such business without authority from the Board after an application deciding it is in the public interest. The question arises as to the legality of a combination of an uncontrolled indirect carrier and a direct carrier to conduct international carriage of passengers." The exemption will not be at the long-term public interest, as charter law popular the present demand may be.

Route Security-The permanent public interest is the creation and maintenance of a strong international air transport system for the benefit of all people. The foundation of such a system is security of route.

By the means of the words "direct" or "special service" in the Act it [the Board] purports to ensure as it thinks never intended by Congress, and as not a thing by Congress, sought to be avoided—a hybrid airline, half travel agency and half air carrier, which only exists a license to fly any route at any time, subject only to the administrative bookkeeping of the Board.

There is little doubt that the CAB's trans-Atlantic air policy for 1993 poses to develop in one of the most concentrated one used by that agency. The administrative procedures require separate hearings on each charter application. In each instance, as appeared in previous, the door is swinging wide and wide. As the danger of this policy becomes more evident, any effort to turn back will become difficult if not impossible.

—Selig Altschul

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that of other models. Load has been increased to 40 inch-pounds—an increase of 80%. Power is delivered through top gears—worm gears have been eliminated. Minimum operating time is now only .5 second. (Time up to 3 seconds also can be provided.)

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## AERONAUTICAL ENGINEERING

### Wing Divergence: Danger in Fast Flight

Flexibility of airfoil structure creates grave stability, control and structural problems for plane designer.

By Robert McIlwain

Due to the past few years, steady trend and structural design of aircraft assumed a rigid structure. Not only did this assumption greatly simplify calculations, but it was a reasonable one on the basis of aircraft speeds then common and in view of the materials and structural techniques then in use. As a result of these two conditions, loads were low and structural rigidity high.

Structural stiffness and structural strength are closely but not integrally linked. Complete, for example, two wings with identical maximum allowable stress values but wide variation in flexibility. The rigid wing will support this stress load with only a slight deflection. The flexible wing will support this same load but must deflect through a substantial distance to do so.

► **Stiffness Importance**—Rigidity between structural strength and structural stiffness is quite close up to some value of the load determined by a wide variety of conditions. After this value is exceeded, the two characteristics diverge rapidly. Since the loads on early aircraft were usually below this value, design partly by strength provided a structure sufficiently stiff to be considered a rigid body.

Recent trends in structural design, however, have moved the problem far beyond this value of the load so that structural stiffness has now become, in some degree, the basic structural design criterion, with strength actually a secondary consideration. This is true in the case of high-speed aircraft which traverse both wings and high structural loads.

► **Aluminum Removal**—One of the early serious results of the assumption of structural rigidity was the phenomenon of twisted control surfaces when reversed, since the wing but normally deployed greater flexibility than the stabilizer, because of its greater aspect ratio.

An example, for example, that the aileron is deflected down. This causes an increase in lift over the wing panel through an increase in the angle-of-attack. The increased load on the

aileron, however, produces a drop on the wing about its elastic axis, which tends to decrease the angle of attack, and, therefore, the lift. Thus, there is a motion in two conflicting actions on the wing.

Amount of this torque depends upon the lift generated by the deflected aileron and, in turn, on the square of the aircraft velocity. Knowledge of the wing to this torque is provided by its structural stiffness, and it, therefore, independent of the airplane speed.

It is apparent that there exists a velocity at which the attempt of the aileron to decrease the angle-of-attack is not matched by the attempt of the stabilizer to decrease the angle-of-attack. At this point, further movement of the aileron produces no increase in lift and may, in fact, produce a decrease in lift, or the reverse of that intended by the pilot. This velocity, therefore, is termed the "divergent control speed" and is a function of the wing structural stiffness. Aileron reversal speed is high for a stiff wing, low for a flexible wing.

► **Divergence Speed**—The wing itself, with its various aileron action, may be subjected to this same phenomenon. For example, as the angle-of-attack is decreased and the resultant velocity increases, the control surface moves aft, causing an a torque about the wing elastic axis.

This torque produces a deflection of the trailing edge upward which, in turn, further reduces the angle of attack and thus the entire-of-passage further to the side.

Since, as stated previously, this aerodynamic torque increases as the square of the speed while the resistance of the structure is some fixed value, there exists a speed at which both effects balance. A further increase in the speed will result in further deflection of the wing, which will structural failure occur.

This speed is termed "divergence speed" and refers to the wing itself, as distinct from "aileron reversal speed." For obvious reasons, the two phenomena are closely connected.

► **Hicken**—The theoretical possibility of control reversal or divergence due to wing twist was recognized as early as 1920 by Hicken in Germany and was given further comprehensive treatment by Cox and Pugh in England in 1932. By 1935 these problems were the subject of extensive reports from the scientific and technical staffs of Japan, Italy, Germany and England.

While U.S. engineers followed these reports closely, the problem remained largely one of theoretical interest, since it had not yet become of serious practical importance. As always, when problems had to be solved first before such refinements became of value.

For example, such aerodynamic problems were of less interest in the absence of accurate methods of predicting control surface characteristics or of specifying satisfactory wing qualities of aircraft. It was impossible to detect accurately in aircraft control until recently were available to tell the engineer and the pilot what such control characteristics "ought to be."

► **NACA**—Woolf-Frost comprehensive treatment of the research developed by the wing when the airplane is disturbed from steady flight was published in April, 1935, by the NACA. This report provided theoretical stability and control characteristics of wings with various amounts of taper and twist and thus made possible the prediction of such characteristics in the design stage.

It is interesting to note that in this close report, "the secondary influence of dihedral" is neglected.

Simultaneously, the NACA Langley Laboratory had been investigating the flying qualities of a variety of aircraft to establish design requirements, or what the airplane "ought to be," from the viewpoint of safety and comfort.

First report of this activity was issued in April 1940, and was confined

in an examination of the airfoil and load characteristics of 28 different aircraft configurations? By comparing results of these test flights with theoretical values obtained from Fig. 7, it was found that "airfoil effectiveness developed in flight may be considerably less than that theoretically predicted . . . , presumably because of wing bending."

The NACA, therefore, initiated an investigation of the discrepancy between theoretical and actual values of control effectiveness (in a desire to adapt its wind tunnel results more closely to aircraft design by the manufacturers). Results of this comparative analysis appeared in October, 1931, and suggested that an empirical constant of 0.90 be used to estimate for the various factors contributing to the reduction of rolling effectiveness in flight.<sup>1</sup>

While this simple correction factor has proved accurate for low values of Mach number and, consequently, low values of wing deflection, it was apparent that an accurate method of judging the effect of wing twist on airfoil effectiveness was needed.

• **Hansen's Method.**—Such a method was developed by January, 1934, by Sidney M. Hansen of the NACA Langley Laboratory.<sup>2</sup> Although its complexity precludes mathematical treatment here, a graphic representation of its accuracy and its estimation of the percentage effect of wing twist under aerodynamic load on the rolling effectiveness of a typical fighter plane is shown in Figs. 1, 2 and 3. Fig. 1 is a plot of the calculated rolling effectiveness of a Republic P-40C fighter plane, when its wing is assumed rigid and when the method of the article is used to determine the effect of aerodynamic twist. A more graphic indication of such effects is shown in Fig. 2, in which the ratio of rolling effectiveness of the flexible wing to that of the rigid wing is plotted against indicated airspeed. Three factors indicate that the effect of wing flexibility is not negligible: (1) a wing of 400 mph. is to reduce rolling effectiveness from 0.00347 to 0.00239, or more than 30 percent. Actual reversal occurs at an indicated speed of 345 mph.

• **Flight Test Proving.**—To test the accuracy of the theory, a full-scale Republic P-40C fighter was subjected to extreme flight tests to determine its actual rolling effectiveness. Results of these tests are shown in test points in Fig. 3.

Curve A is the calculated rolling effectiveness of the surface assuming a rigid wing.

Curve B is the calculated rolling effectiveness using the newly developed method.



Fig. 1. Calculated rolling effectiveness of P-40C fighter (100 ft).



Fig. 2. Ratio of rolling effectiveness of flexible wing to that of rigid wing.



Fig. 3. Comparison of calculated rolling effectiveness of a Republic P-40C fighter with results of flight test.



Fig. 4. Effect of Mach number on rolling effectiveness of a typical fighter plane.

Close agreement between Curve B and the flight test points indicates the accuracy of the method.

• **Chart Developed.**—The war years, which witnessed rapid increases in aircraft speed, led to a need for a more effective and accurate method of determining the effect of wing twist on rolling effectiveness. A new method of determining the effect of wing twist on rolling effectiveness was developed, based on the principle of the method of the article.

The new method is based on the principle of the method of the article, and is a more accurate method of determining the effect of wing twist on rolling effectiveness.

was to reduce the labor required in such computations that a series of charts was developed by the NACA Langley Laboratory, which greatly reduced the time necessary for calculations.

While these charts do not produce the high order of accuracy available in some of the other methods, their accuracy has proved widely usable, while saving hundreds of man hours. • **Rolling Power.**—Effect of compressibility on rolling power of wings is generally similar to its effect on the lift and drag coefficients, since the rolling power and the effect of twist are determined by the aerodynamic characteristics of the wing. Fig. 4 is a plot of rolling power vs. Mach number for an elliptical wing.<sup>3</sup>

As is customary, the trend curve through the test points is an advisory evaluation based upon experience with other parameters, since neither theoretical nor experimental results are available in this region.

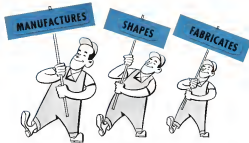
It will be seen that for both the case of the rigid wing and the elastic wing there is a substantial loss in rolling power in the transonic zone and, whereas the rigid wing can ultimately reach its maximum value, the elastic wing never approaches its ultimate value in the supersonic regime and actually falls to zero at a Mach number slightly greater than 2. An important value is that twist beyond Mach number one, at which point the rolling power of the wing is reduced to only 10 percent of its original value. This would result in a loss of rolling power and prevent the airplane from responding to its airframe at supersonic speed.

However, the airframe required for response at a given Mach number will be of quite simple wing planform and of supersonic flight is confined, in this case, to an altitude greater than 30,000 ft., the airplane could be rolled satisfactorily with a sufficient value only one third that necessary at sea level. This consideration explains, in part, the extremely high altitude nature of the early supersonic aircraft's flight test program.

• **Sweep Factor.**—Use of sweep complicates the problem. In the swept case (considered throughout the foregoing) any twisted surface has been considered, rear wing bending has been an effect on wing planform distribution.

The swept wing, however, introduces the additional problem of wing bending stiffness, but deflection of the wing tip produces a deflection of the aerodynamic center of the wing resulting in a change along the wing resulting in an angle of attack, change and, conse-

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Fig. 5 Relationship between leading and trailing airfoils of swept wing for given lateral control (Ref. 1)



Fig. 6 Effect of upstream speed on rising part of tip and leading wing (Ref. 1)

quently, a lift redistribution. Thus, in the case of aileron movement at the tip of a swept wing, the aileron lead results in leading deflection which produces a wing twist. As in the unswept case, this twist is opposed by the wing leading, softens and a speed is reached at which aileron reversal and wing divergence occurs as a result of leading deflection only.

If we now add the effect of wing torsion it becomes obvious that the reversal speed due to leading is lowered. Thus, in the swept wing, the reversal speed is a function of both bending and torsional stiffness. This relationship is plotted in Fig. 5, which indicates that for a given value of either bending or torsional stiffness, there is a value of the other required in order that positive lateral control be assured.

There is another feature of the swept wing, however, which tends to raise even its susceptibility to divergence. The divergence speed of a wing is determined largely by the distribution of the aerodynamic and flexural axes, the closer together these two axes are the lower the critical speed. Since, in general, the use of sweepback tends to move the elastic axis rearward, this distance tends to increase and, therefore, to increase the divergence speed.

Calculations indicate that in some cases wings with sweepback beyond a high low value cannot design. The consideration is of the transonic region in the transonic and supersonic flow, since the flow changes characterized with passage through the transonic region causes the aerodynamic center of the wing from the quarter-chord to the half-chord point, resulting in the loss

ing of the elastic axis forward of the aerodynamic center, lateral effectiveness from divergence is impossible.

► **Supersonic:** For the case of supersonic flight, generic changes created by aileron deflection cannot propagate farward to redistribute the pressure of the entire chord. As a result, the loads must be accommodated by the aileron itself, resulting in greater torsional moments about the wing elastic axis and, therefore, greater wing deflection. Hence, aileron effectiveness and, consequently, rising part of a wing in supersonic flight is comparatively low. It follows that supersonic ailerons

must be extremely strong, have large areas and large angles of deflection. The loss of effectiveness of aileron power with Mach number is shown in Fig. 6, which is a plot of data from Ref. 10, and Fig. 7, plotted from Ref. 15. The case derived from Fig. 4 is that the latter was obtained by using the Prandtl-Glauert correction to the subsonic calculation, whereas Figs. 5 and 7 are obtained on the basis of supersonic wave drag considerations.

► **Engineage:** Ducted—Thus far we have considered only the case of a flexible wing/aileron combination but these same considerations apply with

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Fig. 1 Comparison of Mach number on wing area of hypersonic fighter wing (100,000)



Fig. 2 Distribution of velocity and velocity gradient by ratio of velocity to free stream velocity

even greater severity to the problem of compensating flexibility and elevator load-control. This case is considerably more complex than the analytical possibilities because of the many additional modes of deformation.

In the case of compensating flexibility, we must consider stability twist and vibration, fuselage bending, elevator twist and panel deformation. These deformations are result from stability, stability, stability, stability and elevator pressure distribution.

Fig. 3 illustrates the contribution of stability flexibility and combination fuselage-vibration flexibility to a vibration as aircraft pitching moment due to wing elevator angle movement. This figure shows the large effect of fuselage flexibility on the reduction in control effectiveness. Even in half control speed the amount of control obtainable is only about half that which would result from a rigid fuselage and stabilizer.

The foregoing has illustrated the severe adverse effects of structural flexibility on control effectiveness, particularly at high speeds where the loads are high.

And high-speed wing design has dictated the use of thin wing and tail sections, which is unfavorable to the achievement of structural stiffness. The latter is most easily obtained by large amounts of inertia of structural elements, which require employment of new design.

Therefore, it follows that the aerodynamic and structural requirements for high-speed flight are antagonistic and require careful compromise for practical solution.

Fortunately, as has been shown, there are now available effective analytical methods for the determination of control effectiveness of flexible struc-

tures.\* Such methods permit rapid to consider design through the elimination of excessive control configurations. It is now possible for the designer to provide the degree of control required by the mission. It is the latter on which the greatest responsibility now falls, must be most chosen: the degree of structural stiffness required, with its adverse effect on the weight and cost of the airplane and, therefore, its performance and economy.

## References

1. Aerodynamics & New Systems, Aircraft Week, May 15, 1958.
2. Wing Design, Aircraft Week, May 15, 1958.
3. Wing Design, Aircraft Week, May 15, 1958.
4. Wing Design, Aircraft Week, May 15, 1958.
5. Wing Design, Aircraft Week, May 15, 1958.
6. Wing Design, Aircraft Week, May 15, 1958.
7. Wing Design, Aircraft Week, May 15, 1958.
8. Wing Design, Aircraft Week, May 15, 1958.
9. Wing Design, Aircraft Week, May 15, 1958.
10. Wing Design, Aircraft Week, May 15, 1958.
11. Wing Design, Aircraft Week, May 15, 1958.
12. Wing Design, Aircraft Week, May 15, 1958.
13. Wing Design, Aircraft Week, May 15, 1958.
14. Wing Design, Aircraft Week, May 15, 1958.
15. Wing Design, Aircraft Week, May 15, 1958.
16. Wing Design, Aircraft Week, May 15, 1958.
17. Wing Design, Aircraft Week, May 15, 1958.
18. Wing Design, Aircraft Week, May 15, 1958.
19. Wing Design, Aircraft Week, May 15, 1958.
20. Wing Design, Aircraft Week, May 15, 1958.

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## NAA Builds Huge Propulsion Lab

Private test facility to prove company-developed rocket motors and components for use in guided missiles.

A complete research station for testing and evaluating rocket motors and their components, aimed to be the most thorough evaluation of its kind within the world's industry, is being constructed by North American Aviation in the rugged Santa Susana mountains near Los Angeles.

So-called "NAA's" Aerophysics Field Laboratory will be composed of three principal units: a service building, a components test laboratory, and a motor test area.

For more than three years the company's engineers have been doing research and test on rocket motors. For two of these years the work has been done in temporary facilities. As the majority of the new job will greatly facilitate progress on developing these propulsion systems for the guided missile program.

**Service Building.**—This unit has been finished and engineers are steadily working in its offices, instrument test and equipment development laboratories. The structure is 90 x 210 ft. and has a central machine shop and a high bay area where complete propellant systems can be assembled in a vertical position prior to being taken to the test area.

**Components Test.**—The components of NAA motors and propulsion system built at Downey will be tested in the components test lab. Test cells for proving stress generators and motor pumps have a strong, ready design. One cell will contain an 800-hp. 1718-hp electric motor producing 1,000-hp. for thrust duration to operate complete motor situations. These test cells are



This tower will house motor being tested. Power will be returned in 75 ft. jet.

37 ft. deep, 16 ft. high and vary from 30 to 14 ft. in width. They are protected by thick concrete. Observation windows are typical thicknesses of 18 in.

**Motor Test Area.**—Rocket motors of 300 to 10,000-lb. thrust will be tested in the propulsion test control station, having 18 ft. 23 ft. long jets, a spark shop, and propellant storage facilities.

For test, the complete propulsion system with propellant and all controls will be calibrated within a preparation tower. Then a shrouded spark shop will pick up the motor, move it along a 150-ft. rail to the main test tower and lower it into the

structure. Engineers working on the specially designed and constructed platform around the 40-ft. tower will make final installation tests.

Once the installation is completed and operating instruments in place, the engineers will take advantage within a blockhouse having 18-in. thick concrete walls, 500 ft. from the tower. The blockhouse will contain 27 racks of electronic recording equipment and 70 test instruments for measuring temperature, pressure, force and flow.

At the test tower, with working platform attached, the tower over the main propulsion system cells, tele vision camera will record the activity on the spot. The motor thrust will be down a 75-ft. flame jet tower on 5-ft. thick concrete pad.

The Santa Susana site, first discovered by aerial photo survey, is a 4,000-ft. long, 500-ft. wide bowl-shaped valley, rimmed by 100-ft. rock ledges.

## Navy's New Tunnel Opens At MIT

Recent dedication of the Naval Surface Laboratory at the Massachusetts Institute of Technology marked the opening of the largest full-scale closed wind tunnel to be operated by an American university.

Designed to develop speeds up to 1000 mph, the new tunnel and lab building represent an investment of \$2,670,000. At the dedication ceremony attended by leading scientists, Navy and government officials, it was described by Rear Admiral A. G. Noble, chief of the Navy Bureau of Ordnance, as "the most advanced design in our present thinking."

The tunnel will be used for testing scale models of aerospace vehicles and components, and for research to obtain basic aerodynamic information. Investigators who will be aided in improving aircraft and automatically guided systems.

The test section—large for a university tunnel—measures 3 ft. (34 ft. 2 in.) in diameter. Air density can be changed to duplicate various altitude conditions and since the installation is capable of sustained high speed operation, it is suitable for studying problems regarding supersonic conditions. Test section includes a diffuser to maintain air motion on the model and an applied system to draw fluidity the shock waves and flow patterns.

The tunnel proper is a large, closed steel channel, through which very dry air is circulated by two centrifugal compressors, electrically driven by motors producing a total of 30,000

hp. Heat generated by the compressors is removed by two large cooling coils which draw about 5000 gpm. of water from the nearby Charles River.

The laboratory will be under the administration of MIT's department of aeronautical engineering headed by Prof. Jerome C. Mueller. Design of the wind tunnel, balance system and other instrumentation were under the direction of Prof. John R. Mueller, director of the laboratory.

## Jet Power Lowers Wind Tunnel Cost

By utilizing a turbojet as a wind tunnel power source, a British aircraft builder has been able to construct a portable tunnel at a cost and to be below that of a conventional test facility.

English Electric Co., designers of sleek Canberra jet-powered bombers, developed the novel wind tunnel to aid in the primary research on their bomber project.

Power plant is a Rolls-Royce No. 6 turbojet rated at 5000 lb. static thrust. An open cycle tunnel system is used, i.e., air enters one end of the tunnel and is exhausted at the opposite end. A vane-shaped motor is mounted around the No. 6 turbojet so that the jet exhaust induces a flow of air through the duct.

**Operation.**—As it draws in through the intake screen at the tunnel entrance and moves downstream past the throat throat. The turbojet engine is mounted in a nacelle a short distance downstream of the throat. About one-third of the air goes into the compressor inlet and two-thirds passes through an annular passage around the engine and thence through the ejector and out the tunnel exhaust.

The tunnel has a free Mach number of 4.0 at the throat but this is reduced to about 0.85 with a test model in place.

English Electric Co. hopes shortly to move to this operating speed to operate with variable throat modifications, utilizing the same engine.

Flexibility cannot be obtained by changing a portion of the tunnel which is secured to run with the incoming fresh air. In that testing the inlet air, it is basically a low-speed and continuous flow tunnel.

The English Electric installation is extremely compact, the entire equipment being contained in a wartime one-piece casting test cell 60 x 34 x 18 ft. and one only a few thousand pounds. The other British aircraft companies are constructing large tunnels, based on the wing design developed by English Electric.

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## Jet, Piston Plane Aids Shell Research

A program to study performance of jet fuels under actual flight conditions in the first pre-piggyback research phase to be operated by any petroleum company, has been announced by the Shell Oil Co. (Houston, Texas, June 27).

A converted B-35 type bomber, the plane is equipped with two Pratt & Whitney R-3600-43 engines, and a General Electric T-31 turbojet installed in the fuselage. The craft was acquired by Shell from the Air Force and now is being fitted with analytical and monitoring instruments at Oxnard, Calif.

Test drivers enrolled in the plan will provide detailed information on performance of fuel and lubricant on both piston and jet engines. A comprehensive series of thermographs will be employed to measure cylinder temperatures of the oil and fuel. A Sperry engine-analyzer, with a scan rate similar to that on a radar set, will enable engineers to study operation of each cylinder. Other facilities will be an oil-flow measuring device which continuously weighs the quantity of the oil recirculating through the engine, and an instrument for checking the volume of blow-by gases in the condenser as an indication of the

performance of the lubricating oil in the regions of the piston, rings and cylinders.

Instruments are attached to that a minimum of visual readings has to be recorded while plane is in the air. A camera, mounted in front of the pilot, photographic paper, data, at regular intervals. And a recording potentiometer registers other data on a tape. After flight, data are transcribed on special forms for analysis.

A pilot, mechanic, research engineer and instrument man will be permanently assigned to the craft. Overall direction of research will be in the hands of a steering committee headed by James Doolittle, Shell Oil vice-president.



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## Spring and Solenoid Insure Hoist Safety

New device at Sole Airtex's San Diego plant increases the safety factor of lifting equipment by providing controls to within 5 percent of its maximum lifting capacity. Developed by Tooling Superintendent Wally Mowse, the mechanism comprises a heavy-duty spring contained in a steel housing, mounting a solenoid.

When the hoist picks up a load the spring compresses, and so long as the weight does not exceed the maximum capacity of the hoist the electrical cut-out remains closed. When this maximum load is exceeded, the spring compresses fully, actuates the solenoid to open the circuit, stopping the hoist and applying the brake. At this point the only means which will operate is that controlling the solenoid.

The safety device was designed for use on a two-ton Slingshot-Mini hoist, but hoists or cranes of greater capacities can be equipped similarly by increasing the size of the spring and substituting it in the maximum safe load limit of the equipment.

## PRODUCTION



FIRST B-110 Bonanza is at all round construction and is powered by a 140-hp. Alfa Romeo. Gross weight is about 2200 lb., top speed about 170 mph, and range is 621 mi.



MARCHI B-110 is new Italian light transport powered by two 155 hp. Cessna models. Of all metal construction, only it will be able to top speed of about 200 mph.

## Jet Deal Sparks Italy's Comeback

DH license will add firms that have been struggling to survive. Few new planes are being tested.

Following successful conclusion of an agreement permitting construction of British jet-propelled aircraft and jet engines in Italy under license (Aeronautica, June 27), a new Italian company has been formed to carry out the project. The representation is known as the Italian Consortium for the Production of Aircraft (ICIPA), with capital subdivided in equal parts by Macchi, Alfa Romeo, Fiat, and Ansaldo.

Chairman of the board will be the president of the Ansaldo group, Ansaldo-Italo and bank of division will be made up of two others representing the Ministry of Aeronautics, Fiat, and two representatives of each of the subsidiaries.

ICIPA will sign the contracts with the British company, the Vampire fighter and Goblin tankjet engines, Alfa will be produced by Fiat at Turin and Macchi at Varese, with spare

parts and accessories to be made by Ansaldo at Bergamo. Engines will be made by Fiat, Turin and Alfa Romeo at Milan.

Industry in Rome Shape—The licensing agreement with Britain has been an encouraging event for Italy's aviation industry, for recovery since the war has been largely restricted by political interference and the country's bad financial state. Some established firms have closed doors, and some of those still surviving have converted a large part of their facilities to other than aviation lines.

Here's how the individual facilities are making out:

- Breda is still light testing its large four-engine airplane, Zappala's EG-50 55-50 series. A new design is Fiat's BT-47, a 15-passenger, high-wing monoplane powered by two light Fiat engines, AG-40 in line engines of approximately 800 hp each. The craft has been

built now like the Boeing Stearman. The BT-47 is expected to make its first flight soon.

- Savoia Marchetti is producing the four-engine 30-passenger SM-95, and has license for the passenger SM-10, a small eight-place low-wing transport powered by two 500-hp. Bregno engines.

- Ansaldo is turning out the 57 military trainer. This is a low-wing two-place tandem craft with conventional retractable landing gear, and can be powered by either the 225-hp. Alfa Romeo or a 300-hp. DH Gipsy Queen. One of the company's new designs is the BT-512, a high-wing transport powered by two 225-hp. Alfa Romeo. Landing gear is conventional fixed type.

- Fiat is producing the G-212 26-34 passenger version, the two-engine G-45 trainer, and several models of the G-59 tanker powered by the Bello-Royce Merlin.

- Macchi is turning out the two-place MB-155 lightplane with fixed tricycle gear—the available with fixed and powered by an 85 hp. Continental. Top speed is about 125 mph. The company is also testing a new design, the MB-150 (tentative).

- Caproni shut down once after equipping flight tests at the steering CA-795 light transport. This was a 54 place low-wing monoplane powered by two 310-hp. piston in line engines. Three radars and tricycle gear were other features.

- CANT, another famed manufacturer, holder of a number of large record-breaking records, is stated to have still only gone up within production.

- Ence Week-End-Roller. Ence, at once consists of between 300-400 small planes (mostly from the U. S. and Britain, including Stearman, P-51, and a few P-40). Some 100 two-fifths of the total are now in production.

- Aerline Activity—The IAL (Italian Aeronautics) is producing of 54-55 million in L-12 (Italian Aeronautics) has produced of 3 two-engine American transports (Aeronautica, June 27).

- Alfa Romeo—L-12 (Italian Aeronautics) has produced of 3 two-engine American transports (Aeronautica, June 27).

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## PRODUCTION BRIEFING

► **Lock, Inc., Great Rapids, Mich.**, is testing for quantity production of Type F-61 aircraft and Model 500B-E variant gyro indicator system after receiving Air Force orders for these units totaling \$1,417,017. Aircraft are scheduled for installation in Northrop F-69 fighters, while gyro indicator systems—also known as remote reading artificial horizons—will be used in its B-36 bombers.

► **Aircraft Mfg. Co., Los Angeles**, announced receipt of \$2,500,000 in production orders for aircraft components during next six months beginning Oct. 1. New business—\$1 million of which is for electrical actuators—comes from about 40 different customers and is for 52 types of aircraft. It includes cabin pressure controls and heater refrigeration units for 100 Cessna jet fighters, heat exchangers, electronic instruments and cabin pressure controls, etc., all involving about 18,000 individual units. Aircraft backlog on Nov. 15 was \$13.5 million.

► **Texas Engineering & Mfg. Co., Inc., Dallas**, has obtained a \$148,000 contract from the Brazilian government to re-habilitate and overhaul six C-47s. Based makes the north Brazil country for which Texas has rehabilitated military and transport aircraft. The firm also has received a contract from Argentine Airlines to assemble and modify 100 jet fuel system materials used in the country's DC-6s, and has just completed work on a push-back cold storage locker for Argentina.

► **Kennan Aircraft Corp., Windsor Locks, Conn.**, has received its first Navy order for helicopters and jet propellers to be delivered in 1952. Included are an additional helicopter research contract with the Navy, the firm has a contract backlog of \$146,000.

► **Pitt & Wilbur Aircraft Division, United Aircraft Corp., East Hartford, Conn.**, has delivered over 6000 West Wing engines since 1948. The company also reports that during the last five months of this year, turbine assemblies per million man hours worked at its plants dropped to 1.6. This compares to 9.5 in 1947, 5.6 in 1948, and to a national average of 4.5 for all aircraft engine makers for the year in the PW's sister division, Sikorsky Aircraft, has delivered its 200th helicopter of the S-61 series, leaving to receive 300, the total number of engines built by the firm.

► **United Aircraft Corp.'s Hamilton Standard Division** is in production of a new reversing hydraulic propeller designed especially for the 107,000-lb variant of the Lockheed L-749A Constellation.

All Constellation now on order or in service with American flag carriers will be Hamilton Standard equipped, according to the manufacturer.

► **Aero Corp.**, is converting five Cessna flying boats for KLM Royal Dutch Airlines. The former Navy PB5s are being worked over at Atlanta Municipal Airport, Fort Caldwade, recently delivered, accommodate 18 passengers.

► **Alouett Component, Inc.**, has opened an aircraft hardware and accessories showroom and general office on the Ford City Airport at Boston, Hudson, Mich. While most of the company's business is mail order, it has set

up the display room to satisfy "fly-in" customers.

► **Lockheed Aircraft Service, Inc.**, has received a contract to inspect, test and overhaul all instruments and airborne accessories on Stratocruisers operated by American Overseas Airlines. Work will be performed in L-48 shops at Nassau Airport, Sayville, Long Island, N.Y.

► **Canadair, Ltd., Montreal**, reported it was 64 months ahead of schedule in a recent delivery of 32 Canadair T-7 (Agave) airplanes to British Overseas Airways. The 32 presented only one BAC-51B 000,000.

## Latest Air Force Bid Awards

An National Command Procurement Division makes available to American firms the latest bid awards made on this page. Requests for further information should be sent to Contracting Officer, K-405, Wright-Patterson AFB, Dayton, Ohio, attention MCFP55212.

### AWARDS

For pump and refueling unit assembly (24-011).

Dynalco Aircraft Products, Inc., Dayton, is a bid of \$197,781.50.

For test equipment (15-044).

Cometron Electronics—Cable Wireline Co., Washington, D.C., is a bid of \$15,000 and Radio Wire Prod. Co., Dayton, is a bid of \$14.

For engine accessories (aircraft).

Westchester Electric Corp., Dayton, is a bid of \$10,000.

For engine accessories (aircraft).

S. C. Carter, Inc., Dayton, is a bid of \$10,000.

For engine accessories (aircraft).

McNally and Co., Ft. Worth, is a bid of \$10,000.

For engine accessories (aircraft).

Johnson, Inc., Dayton, is a bid of \$10,000.

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Competition charging—A. J. Robinson Co., Cincinnati, is a bid of \$10,000.

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# Larger · Faster · Finer Douglas Giant Transport Family



## DC-6

MOSE POPULAR LUXURY AIR TRANSPORT in service today is the great Douglas DC-6. Navy has of these 253, depending on places are now in service in leading commercial airlines. The DC-6 carries more passengers in the U.S. than any other type of aircraft.

Douglas has established an unusual record for fast, reliable service on spare parts and maintenance. Swift, dependable, easy to fly and free easily to maintain it is no wonder the Douglas DC-6 has achieved prime popularity with both flying public and airlines.



## DC-6A

NEW "LIFELINGER" CARGO TRANSPORT opens new era in the rapidly expanding air cargo field. Currently being exhibited to airline clients by the "Lifelonger" is the first four engine cargo airplane specifically designed to fill the need for a modern, medium

size cargo airplane for military and civilian use. In contrast to the Douglas DC-4/C-54, the new DC-6A carries 1/3 more cargo at 1/3 less cost. The DC-6A flies 300 mph faster than the DC-4/C-54—thus making possible single day transcontinental cargo service.



## DC-6B

THE NEW DC-6B will be the most versatile air transport ever designed. Like the "Lifelonger" it will be 1/2 foot longer forward of the wing than the DC-6 and thus accommodate 8 additional passengers in DC-6B luxury. High density models will carry up

to 72 passengers. The over 2000 DC-6B with large galley, comfortable and lounge will carry 54 passengers in air conditioned comfort. The 3600 hp developed by the Douglas DC-6B engines will make this the fastest aircraft luxury air transport in service.

These Curtiss propeller features are *service-proved*

They have accumulated flying time on various types of aircraft... over all air routes. Certain first-innovators in service use automatic synchronization, remote thrust and lifeline and blade—three great propeller developments. Each of these features has been service-proved on commercial and military aircraft. Each is duly adding more flying time. Here are the service-proved facts about...

**CURTIS'S AUTOMATIC SYNCHRONIZATION**—It "gears" the speed of all engines electronically under the control of a single cockpit lever. . . eliminates idling, lugging, off-idle-throttle engine "beat" . . . assures greater passenger comfort . . . less flight wear for other engines.

**2 CURTISS REVERSE THRUST —**  
It provides the smooth, air-cushioned landing that makes the trip not uncomfortable for the passenger... provides effective braking on wet, icy runways for greater safety. And for more economical operations, Curtiss reverse thrust permits backing and maneuvering without ground assistance... reduces brake and tire wear.

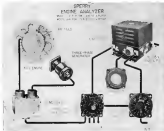
### 3 CURTISS HOLLOW STEEL BLADES

See money flying or landing. Their strong, tough, hollow steel construction, their precision production by over 180 separate operations insure maximum resistance to stress or abrasion even under extreme climatic or operating conditions.

**CURTISS** ELECTRIC PROPELLERS



## NEW AVIATION PRODUCTS



COMPONENTS of analysis (left) and installation in PMA Configuration (right). Scope is lower left and switches (green), alarm

## Evaluation Report

## Engine Analyzer Proved in Service

In only nine months' operation, instrument has helped PAA to cut trouble-shooting time and reduce costs.

**Infiltration of Space agency analysts**  
on its entire fleet of Lockheed Constellation and Boeing Stratojets is not yet completed, but Pan American Airways already has found the instrument baffling passengers' comfort, inducing trouble-shooting time and slowing results.

Initial use has been so favorable that after only nine months of operation it now appears the \$460,000 cost of PMA's 42 units will be amortized in 18 months or less. An evaluation of these results' (June, July, August) appears in *Contemporary Chemicals*.

- Possible engine damage avoided during instances of cylinder lockup and avoidance of further damage—5. Only one engine change due to cylinder lockup.

- Fuel injection troubles spotted with the analyzer—75 thrust with total delay of 22.55 hours

- Average number of truck plugs removed per instance of trouble reported fell to 3.3 units from a average of 5

during a nine-month period before installation of the engine analyzer. And June was an abnormal month due to some temporary spark plug difficulty PAA was having. The engine's engineers believe the present average plug removal rate indicates a clean burn.

►**Business Build-Up**—Success of Pan Am's successful experience, Space Gyroscopic Co., Great Neck, N. Y., manufacturer of the instrument, is building up business for the system.

American Airlines has one in evaluation as a DC-6, American Overseas is studying it for its Stratamasters. Rexam is testing the analyzer in a DC-6. Northwest already will test it on its Strato-cruisers, also using it for some special tests on a Boeing 7-02. Air Canada

has an analyzer installed in a DC-6 Shell Oil unit one in its experimental B-26, Bethlehem Steel has one in its executive Lodgepole.

The analyzer is put to work as a ground instrument either permanently installed in a plane, or in a portable version. The portable version differs little from the airborne installation but

unlike the flight model, his competitors. Randelsoffs also mentions two as special customers, which originally was designed in a ground use only and does not make all the other checks performed by the Space station. PMA uses two Space shuttles at its Miami orbital base, KLM has one in Amsterdam, CAA has one at Oklahoma City, the French Railway has ordered one to be shipped to Paris, and Wright Aeronautical and Cessna Propellers, each has one.

The portable analyzer may turn out to be a more useful item than the on-board model. Use of the analyzer in the air almost demands a flight engineer, so neither pilot nor copilot would have the time to devote to checking and interpreting the scope. So that about shows out two engine aircraft and DC-12 not carrying flight engineers.

However, a portable analyzer can still help an airline not employing flight engineers. All that is necessary is for the planes to be wired for the instrument, and the three-phase generator installed. When a flight crew lands and smooths inside, the portable is placed

• **Time and Money**—The quick plug-in station is the most easily identified saving due to the analyzer. Cost of a plug is about \$575 and labor cost of changing it is about half that. Before the analyzer went into service, PAA service crews had to use trial-and-error methods about a 10-ft-cow-come-and-see

a station and reported a "rough" engine. This generally consisted of changing a complete set of plugs. "You fix the job about two hours."

Now, the analyzer prepares the cylinder where ignition is faulty, and the maintenance crew can go right to the spot and change only two plugs. "Time for the job about 20 minutes for two plugs, 10 minutes for four plugs."

► **Pin Piston**—The analyzer was designed to spot ignition and combustion trouble, and unbalanced engine action. But by actual use in service, Pan American flight engineers and mechanics have been able to identify many other difficulties. An unbalanced piston on the scope was traced to oil on the support points. The next time the flight engineer noticed this that same problem he told the ground crew at the next station that oil was leaking into a magneto and a cylinder head was found to be worn.

These have been other instances of similar nature that all add up to a great plus value for the analyzer. This value is manifested in cutting delays for ground checks. An FAA engineer says, "How can you correct that in dollars and cents?" You can't, but it is an asset that the analyzer has enabled Pan Am to spend up its schedules.

The same engineer says: "Suppose you have a two hour delay at a station in Alaska? You can't lose your position just because there is no other way they can get out. But the next time maybe they won't go by air, or may use another airline."

The plus value is manifested also in holding down maintenance bills. The possible weakness of engine changes in the three-month period is one example. Often are the numerous flight engineer hours noted on the analyzer indication of important troubles before they become pronounced and were able to take immediate corrective action.

Two checks comes only with use of the analyzer. FAA gives it flight engineers and ground crew a two day course on the analyzer. After that any trouble is able to spot on the instrument the great pattern of trouble.

► **Development**—The analyzer is a result of a successful merger of Pan American and Sperry engineering talent. In 1958 Sperry started work on a diagnostic indicator and flew it during the test to work on an ignition analyzer. But the end of the year ended that project at Sperry.

All the time, however, Pan American had been following the Sperry work, and John T. Lindbergh, the airline's representative of standards and development on the West Coast had been performing his own study on an analyzer indicator. He finally persuaded a meeting and as an individual entered

into an agreement with Sperry. Sperry manufactured the engine analyzer under a license from Lindbergh. (Because of this, Pan American bought its instruments directly here, getting a slightly lower than normal price, which runs about \$4000 a unit, installed.)

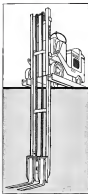
► **How It Works**—The Sperry engine analyzer consists of five components: the receiver, Waco, Oct. 28, 1947, was a total weight of 40 lb. in a Constellation and 45 lb. in a Stratocruiser, with out cable. (Portable weighs 61 1/2 lb.) A telephone generator is mounted on the secondary induction coil of the engine. An amplifier is located in the cockpit near the P/E station. The cathode-ray oscilloscope is mounted in the flight engineer's panel. And there are two switches—cylinder indicator and condition selector—just above the flight engineer's head.

The generator synchronizes the sweep with engine rotation, and triggers the sweep at the beginning of its more exact sweep. The scope's ignition indications are fed back package on the magneto. In theory, combustion indication would be picked up from magneto-induction detectors in the outer walls of each cylinder. PEA, however, has such a pickup on only one cylinder of each engine in the Stratocruiser, and does not use the reference pickup in the Constellation.

With its two switches, the P/E can take a reading on the scope of the complete engine picture, or narrow it down to individual cylinders on either the left or right magneto circuit, or on both magneto circuits. Pictures on the scope show condition of magnetos, spark plugs, cables, distributors, coils, lead-in points, mixture distribution, malfunctioning of injection system and lack of synchronization. Usual "trouble patterns" are selected secondary, small pop large pop, limited pop and open secondary.

► **Operation**—One flight engineer told the analyzer circuit it has been tested off temporarily because of excessive maintenance on the instrument. Pan American can't understand that. Its overhaul basis for the various parts of the analyzer is this magnitude: 1200 hr. for three plug ("wrench") generator at engine overhaul time, switches, 3600 hr.

Flight engineers and mechanics are usually an opinion when first shown the analyzer. It has gotten a big buildup and they can't believe it is that good. "If and when they start to use it, they are convinced. At La Guardia recently PAA's chief trouble-shooter was called a winner about the instrument. "It's a wonderful tool in trouble-shooting," he said. And a PAA engineer confirming the comment asserted: "When a mechanic sees that about an electronic gadget it's got to be good."



### Towmotor 'Elevator'

For raising and lowering heavy loads between balcony storage areas and first floor production lines, Towmotor Corp., 1226 E. 152 St., Cleveland 10, Ohio, offers "Elevator" lift lift truck which can reach down from lifts in floor level. It is better to pick up materials. Released by industry to be one of the first developments of its kind, elevator unit has lifting and lowering capacity of 2000 lb. Full loads can be moved from first floor to 16 in. above balcony level. The unit is built rigidly and does not tilt.

### Masking Tape

Patent sensitive tape, "Mask-All," for general industrial use, is announced by Megal Air Corp., 315 West 39th St., New York 18, N. Y.

Product is reported to have higher-than-average tensile strength, strips off and does not leave any residue, and does not curl. Other characteristics are reported as imperviousness to paint, equivalent and moisture, high flexibility and resistance to distortion, ability to take curves easily and without kinking, and resistance to effects of chemicals. Masking is available in standard sizes.

# FOR DEPENDABLE LONG LIFE

## insist on

# Nickel Alloy Steel Gears

There are two kinds of nickel alloy steel gears... those that are carburized, and those that are direct hardened.

### CARBURIZED GEARS

The carburized gear is used in applications that require maximum wear resistance in the surface, as well as greatest surface compressive strength. With nickel alloy carburizing steels, this goal is consistently attained, together with development of extremely tough cores that resist shock loads, fatigue and bending stresses. Moreover, a chief cause of many gears... the distortion that accompanies heat treating... is laboriously resisted by nickel alloy carburizing steels.

### DIRECT HARDENED GEARS

The direct hardened steel gear is used to carry heavy tooth loading in applications where resistance to wear and surface compressive stresses is not quite so vital a factor. Here again, the nickel-containing steels develop the required strength more consistently and in heavier sections than carbon steels, and are generally more resistant to shock, fatigue and multi-axial stresses. Distortion resulting from heat treatment may be minimized by using nickel alloy steels and their machinability before final heat treatment is very good.

Giving greater play to the skill of the engineer, nickel alloy steels not only provide increased strength without sacrificing ductility, but they

hardens at lower temperatures which simplifies heat treatment and minimizes deformation and warping.

### MEET VARIOUS REQUIREMENTS

Nickel alloyed steels enable producers to meet virtually any reasonable requirements... whether dictated by revised stress analysis due to design changes, or by changed lubricating methods that demand better lubricating qualities or improved response to heat treatment.

### MANY TYPES AVAILABLE

The many standard grades of nickel alloyed steels permit specifying the particular type which provides the best set of properties for any reasonable fabrication and service demands.

Outstanding competitors for higher speeds and heavier loads, for quieter operating and longer machine life, provide opportunities for gear producers to drive ahead with nickel alloyed steels. Use the coupon for your copy of "Modern Trends in Nickel Steel and Cast Iron Gear Materials." This useful and informative booklet is yours for the asking. Send for it now.

**SEND COUPON FOR VALUABLE BOOK**

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THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

## To Support the Ground Forces

**THE** high-speed Martin XB-51 is the Air Force's first postwar plane specifically designed for blasting enemy supply lines and installations in support of ground forces. In addition to its unique power plant arrangement, this revolutionary new plane has drastically sweptback wings, a V-shaped tail and modern landing gear... plus many features still classified under military security regulations.

This tail-blazing aircraft is a typical product of the highly skilled engineering team Martin offers its customers today. Mathematicians, physicists, stress-engineers, experts, electricians, metallurgists and structural engineers... all pool their talents as Martin extends research frontiers in advanced design aircraft, rocketry, jet propulsion, explosive motors and other fascinating developments. The GLenn L. Martin Company, Baltimore 3, Maryland.



**Martin**  
AIRCRAFT

Builder of "Dynaflow" Aircraft Since 1949

## SALES & SERVICE

### Operators Plan Air Taxi Network

Charter services would fill the missing route links between airline-served cities and smaller communities.

Move to coordinate the small local air circuit into a national air taxi network, integrated with the scheduled airlines, is expected about the first of the year, under leadership of a new national charter law conference organized by the operators.

Joe Gerstle, president of Wiggins Airways, Richmond, Mass., and vice-president, transportation, for National Aviation Travel Assn., has been asked to direct the planning for the organization of the new network, which will be independent of NATA, and will work with the Air Traffic Control unit in handling details of the complex nationwide network.

**Endorse Proposal.** At the recent meeting of the Air Traffic Conference in Chicago, the conference unanimously endorsed a proposal for establishing "taxi" or charter service to airline pilots. Previously NATA had unanimously approved the proposal by vote of its operator members at its annual meeting at New Orleans.

Local air transportation services are now regulated by CAB in more than a thousand small communities in which there are 2445 registered "small irregular air carriers."

**Missing Links.** Many economic hops of these small services is in filling in the missing route links between airline terminal cities and the smaller communities in the back areas surrounding the large cities.

Representatives' belief, by a few Midwest facilities operators for Midwest Airlines, is being closely watched by the Air Traffic Conference and the operators. Initial reports indicate the trial arrangement has been actively accepted, and probably the airlines will pick the best of the air taxi operators after a trial period, to serve as ticket agents in their communities.

**Close Route Service.** Integration of the small services with the airlines will enable the passengers from a given route town to board an air taxi at its community's little Class I airport, and fly to the nearest airline terminal city, to meet the aircraft's scheduled stop there.

If the customer wants a round trip, his home town air taxi can arrange to meet him at the airline terminal

city at the time of his scheduled arrival and take him home. Or arrangements can be made with another air taxi operator in the terminal city to give him transportation out to his home town airport.

**Through Ticket.** It is expected that eventually the airline office in the big city will allow airline passengers transportation direct to the given route town destination, making arrangements at the end of the airline leg of the trip to continue by air taxi.

Success of the entire system depends on the efficiency and safety with which it is set up and operated.

**Requirements.** An Traffic Conference has noted, and NATA operators have agreed that the small irregular air carriers comply with the following requirements, initially the time as then required of regular airlines.

**Adequate facilities and facilities and services for providing air carrier traffic for the scheduled airlines and themselves.**

**Reliable, safe and adequate aircraft, reports, and other facilities, manned by competent personnel, and maintenance facilities.**



NEW PAC HEAD

William B. Buck, president and board chairman of Rock Aircraft Corp., succeeds G. J. Rust, president, Continental Motors Corp., as chairman of the Federal Aircraft Council of Aircraft Industries Assn., and is a member of the AIA Board of governors.

tioned in accordance with stipulations and codes for sale and some agreements to be determined by the negotiating parties (sales and operators).

**Observe rules of business ethics governing relations with the public, business operators and the airlines, and between operators as stipulated by mutual agreement.**

**Security bonds must be provided for performance of contract.**

**Adequate liability insurance must be provided, comparable to that furnished by the regular scheduled airlines for their passengers (\$50,000 maximum coverage per passenger seat).**

American airlines are in relatively short air taxi loads between airline terminals and given route airports unless an attractive rate proposition to the airline passengers, already accustomed to arriving by air travel. In most cases the airline passengers can be carried by air taxi to a destination destination 50 to 100 miles from the airline terminal airport in virtually the time it would take to get to the baggage claim area in the airline terminal city and get other surface transportation which would take him to his ultimate destination.

**ATC's position, executive secretary of the Air Traffic Conference, who has been active in development of the program working with NATA officials for the past two years, has been in charge of the conference to proceed with completing the network arrangement for the airlines.**

**Safety Dues.** Some sources expect that some air taxi services may be ready to operate within 60 days if prompt action in formation of the charter law conference is taken.

If it proves however, that the operation will not be in any viable operation for perhaps six months, and that the air taxi service, its operation and pattern are its advantages.

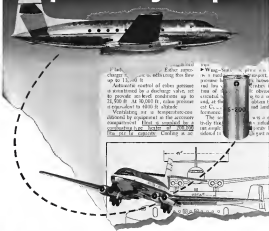
The program is set up to attract the most important operators, and a firm network of contract in equipment, personnel, experience, and liability insurance is required which will probably allow the smaller operators from making it and they are benefit from the experience of some of the better funded, larger operators.

### Brokers Expand

Differences in need almost aviation in widely separated areas have caused Powers & George, aircraft brokers, to create a mid-western office in Dallas, Tex. Manager of the office will be Harry G. Gayle.

Previously, Powers & George had been handling all business from New York. Now, the Dallas office will serve used aircraft dealers west of the Mississippi River.

# Janitrol goes jet!



Each S-300 is built using the new up to 11,000 ft.

Advances in engine technology are maintained by a discharge valve, not to provide an-level conditions up to 11,000 ft. At 10,000 ft., when pressure is dependent to 1000 ft. altitude.

Validating air temperature conditions by equipment in the aircraft. The equipment is installed by a certified technician at 100,000 ft. per 10,000 ft. altitude. During an

Wing-Scan, a pilot can see a real-time picture of the engine and its performance. The pilot can see the engine's temperature, pressure, and other vital signs. The pilot can also see the engine's fuel flow and oil pressure. The pilot can also see the engine's vibration and other vital signs.

The pilot can also see the engine's fuel flow and oil pressure. The pilot can also see the engine's vibration and other vital signs.

Agree Janitrol makes important news. The famous Janitrol S-300 combines power, speed at 200,000 ft./hr., Janitrol's color heat for the brilliant new Aero Jetliner, recently flight tested at Malton, Ontario and reported in the October 5 issue of AVIATION WEEK.

When wall heating and complete air change into a secure secure passenger comfort. Janitrol's famous red-

ant color-heat makes efficient provides maximum heat capacity and reliable high altitude performance in the most compact, lightweight weight unit—"from the heat in half the space." For proven experienced counsel on standard or jet heating problems—on commercial or military aircraft—you'll do well to call your nearest Janitrol representative.

**Janitrol**



ADVANCE AIR-CONDITIONING SYSTEMS *with the whirling flame*  
ADVANCE AIR-CONDITIONING SYSTEMS • 1000 L. 1000

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General Office, Engineering Department and Production, Columbus, Ohio, 43001  
Sales Office, Engineering Department and Production, Columbus, Ohio, 43001

## AIR TRANSPORT

### CAB Invites Atlantic Charter Bids

Paves way for certified and noncertified operators to get in on expected '50 travel boom. Jones hits decision.

Scheduled, year-round air coach service across the North Atlantic likely to remain only a ghost in the eyes of Pan American Airways executives for at least another year.

But there will still be hopes pinned on U. S. Europe air transportation during 1950. And, as a political objective, some of the special low fare operations which will abound next year come very close to PAA's lowest priced objectives.

The Civil Aeronautics Board has declared that because of continued high operating costs neither a reduction in air fares nor a reduction in aircraft capacity will be sufficient to bring the fare of American transatlantic flights to parity with European fares.

Result is a CAB decision that both certificated carriers and long scheduled air operators apply for authority to conduct group charter service between the U. S. and Europe next summer, when Holy Year traffic will be at its peak.

The Board will consider applications which are filed before May 1, 1950, and propose transatlantic charter operations between June 1 and Sept. 30, 1950.

Special Economic Fares—CAB also announced approval of special 15-day roundtrip vacation fares recently proposed by the International Air Transport Association in Mexico City. The schedule, from Atlantic carriers, partly adopted the record low rates which will be effective from Jan. 1 to May 31 and will permit roundtrip travel for only ten percent more than the regular one-way rate.

Airlines offering the 15-day vacation rates are Air France, American Overseas Airlines, BOAC, KLM, Pan American Airways, Sabena, Swissair, TWA, and TWA.

Under the new 15-day roundtrip fares are listed from New York to Amsterdam, Brussels and Paris with only \$497, a saving of \$297 in comparison with the regular roundtrip fare. New York-London is \$585, a saving of \$241. New York-Tokyo is \$455, a saving of \$101. New York-Singapore is \$575, a saving of \$224.50, and New York-

London \$584.60, a saving of \$249.20. Since the new rates are not cash fares, a 15-day vacation ticket will entitle a passenger to exactly the same equipment and service as is usually provided by the North Atlantic flag lines.

Noncertified at Discretion—CAB's new policy in 1950 makes high discount for noncertificated airlines' request for special exceptions to operate during periods other than between June 1 and Sept. 30. The Board and the conditional carrier appear to have agreed expressly with which to handle all requests.

On independent operator, Seaboard & Western Airlines, has requested CAB permission to carry students and Holy Year pilgrims between the U. S. and Europe throughout 1950. (Aviation Week, Dec. 12).

Among the certificated flag lines, Pan American already has received CAB approval for a charter agreement with TWA, a Catholic charitable organization, providing for two "worship class" DC-4 roundtrips weekly to Rome during off-peak periods next year. Life

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TWA'S NEW AIR COACH

Modification work has been completed on the last of several DC-4s which TWA has fitted with 68 seats of 44 seats for use in nonseasonal or coach service during

Dec. 17. The ships will make one roundtrip each between New York and Los Angeles dropping down for an intermediate stop at Chicago.

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CAB's John Depina says, it's still no road.

road. But the airlines, during this Mexico City traffic conference, showed the sagged repair line like water following the speed! 35-day discussion occurred until what CAB also is in.

According to Jesse, CAB's North Atlantic air policy statement for 1969 actually shows the U. S. Europe route open for low-rate tourist travel on a large scale, no traffic law subject the approach, no matter how the words "winter" and "special service" may be construed. The board already intends to hand out exception permits that will be economic, of doubtful legality and spend the public airway.

Jesse said that the special exemption for group charter flights between June 1 and Sept. 30 will not only divert traffic during the summer but also drive new, much of the traffic in 60-day and 15-day, secondary airlines business. For who would travel to

Europe in the winter at special (once and) rates if they can travel in the summer at even lower special (shorter) rates?

► **Tripney to Sullen**—The CAB chairman said the board was yielding no victory to current popular demand by showing some concern to parallel an other airline's certificated since through exceptions proved without due price on of law. He added that the public, through increased road pay, will have to raise good whatever loss the U. S. flying line suffer because of the special exceptions—no matter what the CAB majority says.

"I don't question the kind of success of the majority," Jesse declared. "But there is a question as to whether the board on the part of the Board to another to do it, but an transport system with good intentions such as these."

## Baker Boosts Coach, Condemns Nonskids

Advocates of coach transportation to full partnership with higher priced low key driver would go the toward making the certificated air carrier probable and independent of government subsidy, according to National Air Lines President G. T. Baker.

He declared that both NALM; or really initiated live-into-air DC-4 coach flights and near debut "and expect" DC-6 operations between New York and Miami are going off.

In his recent speech before the New York Society of Security Analysts (Aviation Week, Dec. 12), Baker at the end of his speech, "who state the current from long-haul business during peak season and at last, during off-



AIRLINES' TOP BRASS

Participants of 11 scheduled airlines discussed their plans for their present and future operations at a recent meeting in Chicago sponsored by the Assn. of Commerce & Industry. From left to right, are: F. M. Higgins, Wisconsin Central; Everett Lynn, Assn. of Commerce & Industry; E. V.

Reichenbach, Eastern; and W. A. Patten, United. In row are G. E. Wooten, Delta; J. H. Conover, Capital; R. S. Dwyer, TWA; S. A. Stewart, Chicago & Southern; C. S. McGee, Trans-Canada; G. E. Smith, American; T. E. Russell, British; and T. H. Eady, Ambassador Air Service.

traffic periods." He was especially critical of noncertificated operators with "no way" C-46s fitted with 50 or more seats.

The NALM president and the scheduled airlines can't operate such equipment as passenger service. He declared that the C-46 does not have single-engine performance at 10,000 ft.

► **Second to Apply**—Baker noted that National was the second scheduled domestic carrier to seek permission to start coach operations, but added that it had to file traffic flow data before approval. He said NALM's competitors, Eastern and Delta, had sought National's proposed lower fares since last year.

National's economic plan, which went into effect last spring, accounted for more than 25 percent of the company's revenues during the previous summer months. Coach flights, which went into the New York and Miami markets between 10 p.m. and 1 a.m., were inaugurated Nov. 1 and already are serving non-regular loads.

"Trying to National's revenues group interchange agreements, Baker emphasized that the deals with Pan American Airways and Frontier are in an active stage. These interchange agreements, he said, provide that both PAA and Frontier will have a monthly interest in National and a security representation on the board of directors.

► **Two Objectives**—"In preparing this type of agreement, we had in mind two important objectives. One was to hold and discuss seriously wanted to report that the present management would keep control. On the other hand, I fully believe a man's heart is where his money is."

"I needed to work out a deal whereby both other parties to these transactions (PAA and Frontier) would have some idea deep in the past and would have a real incentive to make these operations a success. But whatever the outcome of the application pending before CAB, National can make money on its own two feet."

Eastern Air Lines President E. V. Rickenbacker last summer suggested that the Pan American-National interchange agreement and stock sale was the result of a "renewal" on Eastern by PAA President Juan Trippe. Rickenbacker and PAA attempted to elicit with Eastern re an interchange and then reportedly said EAL is a plan to buy down the deal from being registered with National.

Baker said National was preparing to handle more passengers this winter than ever before. In the broad view, he said continued improvement in business because of the rapid economic growth of southern states and a shift in tourist traffic to Latin America.



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## Smith Asks U. S. Aid For Jet Transport

American Airlines President C. R. Smith believes U. S. progress in the commercial jet transport field may be seriously handicapped unless Congress next year authorizes the government to help finance development of the high-speed craft.

Speaking before the Chicago Area of Commerce, Smith said he would like to see the development program shared by the Air Line (representing the government) and the airlines, with later participation by the manufacturers. He said the Air Line has been in a hot war since because of their close cooperation in providing various transportation.

► **Avoid Bureaucracy.** The American Airlines president declined to say whether it would be difficult to force a plan to develop jet transports through a committee composed of some government departments in Washington because the last plans he saw produced no clear picture. He said he would push for foreign transport cost most readily if responsibility is centralized for the job to be done.

Smith predicted that with a good push behind the development program the U. S. may have jet transports flying as an experimental basis in three or four years. "Within five or six years they can be in transcontinental operation in limited numbers."

Smith and Chairman of the Civil Aeronautics Board also discussed the need for putting an even jet transport program on a sounder footing. Smith declared that he said that those should be neither more or less about our relative position nor satisfaction for making into construction of jet prototypes.

► **Long Range Plans.** "Our assignment is to produce not just a jet transport, but the best jet transport. It is evident that this is a long range endeavor, and the problem should be approached on that basis."

"The time has passed when a new airplane can be said to have exceeded its speed simply because it has superior speed."

"Today, an transportation of 180 mph is sold at the conventional price. The market of people who will pay a substantial extra for fast speed greater than 300 mph is limited and small."

Only when superior speed can be provided without a corresponding increase in cost, with resultant savings to the public, will the new plane have wide public appeal and become a useful means of transport for the air transport operator, Smith declared. He cautioned that the jet plane today is an extremely expensive machine to design, build and operate.

## Urges Renewal of PAL Franchises

Passenger Air Lines, the nation's first lender, will be in business out of state in six months for another five years if the Civil Aeronautics Board accepts the recommendations of Chairman James M. Verner.

Citing cost per revenue per mile as a good measure of control efficiency, Verner stated that Passengers would like best showing among rate shortlines mentioned for the year ended last May 31. PAL's expenses per revenue mile were about \$10.08, Chicago \$11.88, Empire \$11.89, Florida \$12.56, Midwest \$11.86, Northwest \$11.87, Southeast \$11.16, Trans-Texas \$12.81, and West Coast \$11.93.

► **Renewal Urged-Specifically.** Verner recommended that Passengers be given for Segments 1 (Houston-Amarillo), 2 (Houston-Dallas) and 3 (Dallas-Midland/Odessa) be renewed for five years; that Segment 5 (Dallas-Albuquerque) be renewed for three years; that Segment 4 (Albuquerque-El Paso) not be renewed; and that the Dallas-Waco-Temple portion of Segment 2 not be renewed to Austin.

"Turning to other carriers' local operations in the Texas-New Mexico area, Verner said that American Airlines' routes should not be suspended at Waco and Lubbock and its Austin-Houston service should not be restricted, that Continental Airlines' service should be suspended temporarily at Big Spring, Tex., but not at Las Vegas, N. Mex., and that American Airlines' service should

be suspended temporarily at Abilene and Big Spring but not at Midland/Odessa.

## Airport Aid Carb Echoed by C. of C.

A U. S. Chamber of Commerce committee has lent its support to the growing demand that federal aid to airports be limited to a system of funds not primarily for public support in order to stimulate commerce.

The Chamber's Transportation and Communications Department committee considered the question of whether federal funds should be confined to single-destination outlays on new or existing airports but made no recommendation.

It said that airport buildings should be eligible for federal funds, together with land, progression, runway construction.

Airports should be put on a self-sustaining basis in so far as possible by establishing charges proportionate to their use for the industry, commercial carriers and private operators, the committee declared. Subsidies to domestic airlines, the committee said, should be separate and distinct from payments for transportation of mail.

## Suspend D. C. Stop

TWA and American Overseas Airlines have renewed Civil Aeronautics Board permission to suspend service at Washington, D. C., as a co-terminal.



**CROSS-WIND GEAR IN CANADA**  
Canadian Pacific Air Lines pilots flying out of Magdalen are being trained to use the over-wing landing gear installed on one of the carrier's DC-3's passenger planes. The device permits the wheels to retract automatically, like the carrier's airfield shut, and enables the plane to land in take off without regard to wind direction. Thus the plane can maintain scheduled operations using existing landing fields. Tests show the gear will extend at a 15-degree angle, with the standard wheel in conventional fixed position. CFA says its DC-3 is the first commercial plane in the world on which the over-wing landing gear has been installed.



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on their respective foreign routes for one year. Action on requests by the two carriers to assigned service similarly at Philadelphia was deferred pending a final hearing.

In adding the suspension, TWA and AOA and passenger load factors on their direct international flights to and from Philadelphia and Washington have been substantially low. They pointed out that frequent and adequate connecting service from Washington and Philadelphia to New York is available.

## Hugh Coburn Heads Air Traffic Group

Election of new officers and reorganization for sales promotion campaigns in 1958 was announced by the Air Traffic Conference of America following its recent annual meeting in Chicago.

Hugh W. Coburn, Mid-Continent Airlines vice president traffic, was named president of the group. Other officers leaving the executive committee for 1958 are Walter Stewerling, vice president traffic, National Airlines; first vice president, James W. Austin, vice president traffic & sales, Capital Airlines; second vice president, R. W. Anderson, vice president traffic & sales, Eastern Airlines.

**Recommendations**—The conference unanimously endorsed a plan for an collecting services of the scheduled carriers with small irregular (lightweight) carriers in order to extend taxi and charter service to remote points. Two recommendations made by the conference to the Air Transport Association board of directors call for:  
• Augmented air mail and air parcel post campaign next year with a proposed \$185,000 expenditure for postage.  
• Consolidation of a general part of vending campaign by the industry.

Members of the conference expressed satisfaction with progress under the recent agreement with the armed services calling for increased use of scheduled commercial air transportation by military personnel.

## Transport Institute

Fourth annual Air Transportation Institute conducted by American University in cooperation with the Civil Aeronautics Administration and the Air Transport Assn. will be held in Wash. (UPI), D. C., June 18-22.

Among the 49 sessions slated to address the activities on air transportation problems: D. W. Russell, Civil Aeronautics Administrator; Russell B. Adams, Civil Aeronautics Board member; Maj. Gen. William H. Twiss, Military Air Transport Service; J. H. Connelley, president, Capital Air-

lines; M. F. Redfern, vice president, Air Transport Assn.; Harvey Low, civil aeronautics administrator, Federal Aviation Authority; and C. W. Jacob, vice president, American Airlines. Registration for the institute will be open until Jan. 5.

## DC-3 Improvements Speed Ground Stops

Speed-up features on Capital Airlines modified DC-3 fleet, such as built-in passenger ramps, baggage racks and wheel-height seats down, have resulted in a monthly saving of 6000 hours of ground time in passenger servicing, according to J. R. Franklin, vice president in charge of operations.

Franklin and ground time at each station stop formerly averaged around ten minutes, compared to the current six minutes. Last year, no DC-3 stops were less than six minutes, whereas now 15 percent take no more than two minutes. Result is that the fastest two-minute ground stop on eastern flights has been increased nearly 10 mph.

Capital and passenger loads on routes using the modified DC-3s have increased 20 percent since inauguration of the faster service last spring, and company revenues have risen by as much as \$58,800 monthly over 1944 totals.

## Convair Wage Increase

Wage increases ranging upward from 5 cents an hour have been approved in a 2-year pact by Convairized Vultee Aircraft employees affiliated with American Mechanics Lodge 1125.

The new contract, retroactive to Nov. 30, gives all employees a 5-cent an hour raise and automatically reviews 1 cent an hour for all, and additional raises ranging up to 10 cents an hour for workers whose classifications were changed.

It also provides for increased hospital and medical insurance benefits, and a sick leave provision for the first time. The contract affects between 6000 and 8000 production and office workers.

## Two Unions Merge

Air Line Stewards Assn. (Independent) has merged with the Air Line Stewards and Stewardesses Assn., an affiliate of the Air Line Pilots Assn.

Total representation of ALSSA is now over 1500, including 2900 employees represented by ALSSA prior to the merger and 650 formerly represented by ALSPA. Added to ALSSA's rolls by the merger are stewardesses of United Air Lines and Western Air Lines, bringing to 16 the total number of carriers with which the association has bargaining rights.

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## MCA Plea Denied

Mid-Continent Airlines' application for an alternate route from Kansas City, Mo., to New Orleans via Springfield, Mo., Little Rock and El Dardo, Ark., and Miami and Baton Rouge, La., has been denied by the Civil Aeronautics Board.

MCA now operates between Kansas City and New Orleans by way of Joplin, Mo.; Tulsa and Muskogee, Okla.; Ft. Smith, Ark.; Texarkana, Tex.; Ark. and Shreveport. The CAB and Mid-Continent's proposed additional service would compete with the carrier's assigned route between Kansas City and New Orleans with service of Delta Air Lines, Eastern Air Lines and Chicago & Southern Air Lines for a heated traffic potential.

## SHORTLINES

▲ **Aerov Airlines-CAB** has denied the Los Angeles, Calif., freighter operator's certificate application for the transcontinental coach type service.

▲ **Aerov Airlines-Columbia** routes, which claim to be the oldest airline in the Western Hemisphere, celebrated its 50th anniversary this month. Company has 1000 employees, 14 transport planes and last year flew 400,000 passengers.

▲ **CAB**—has warned that it will deal severely in the future with cases where an airline parent establishment or maintenance of interlocking relationships without open board approval.

▲ **Columbia**—an official CAB report states that the probable cause of a Columbia DC-7 accident at Burlington, Vt., August 20, 1948, was the pilot's action in landing too fast and too close to the runway following a high approach. The ship overran the runway and crashed into trees. Flare reflected vapor damage. A passenger and the crew were none reported.

▲ **Delta-CAB** has requested the carrier's certificate to diagnose Chattanooga, Tenn., as an operational point between Knoxville and Atlanta on route 14. Local service between Chattanooga and Knoxville will be provided.

▲ **Federal**—has begun the post-World War II traffic audit.

▲ **Norfolk-Sherwin** a \$16,323 operating profit in October, bringing its total for the first ten months of 1949 to \$100,532 against an \$11,833 deficit in the same period last year. Passengers moved during the last ten months of 1949 rose 47,000 over the like 1948 period.

▲ **Pan American**—Reports November was the best month in company history for cargo flying through Miami FAN, in cooperation with Compañia Cubana de Aviación, Compañia

Norviese de Aviación, National Airlines and TWA, is offering a \$200-mile excursion across the U. S., through Miami, Cuba and up the U. S. not west from Florida for only \$35 more than the regular transcontinental round trip fare.

▲ **Panama**—has experienced the best November traffic in its history, carrying 9391 passengers against 8791 in the same month last year. Load factor hit nearly 79.51 percent.

▲ **Tennessee**—Reports the 200th transport has passed through the overhaul shop of Aircraft Engineering and Maintenance Co., Oakland, a subsidiary of the parent, both in 1948 and 1949, more all handled in the past 16 months.

▲ **TWA**—Has a total of eight DC-3s available for short-haul special and group travel domestically. The ships are based at five different airports.

▲ **West Coast-Columbia**—its third airplane that month. Since Dec. 5, 1946, the company has flown 175,000 passengers and has consistently been among the top three freights in passenger load factor.

## CAB SCHEDULE

Dec. 12—Prohibiting airlines on Mexico City-Mexico-Lima-Madrid routes for carrier mail routes of American, Const. A. (United 1145).

Dec. 13—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 14—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 15—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 16—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 17—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 18—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 19—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 20—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 21—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 22—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 23—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 24—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 25—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 26—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 27—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 28—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 29—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

Dec. 30—Prohibiting airlines on passenger service of Eastern Air Lines and National Airlines. (United 1145).

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6. **Explosion**—10" long, explosion-proof, explosion-proof.

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In addition to the standard model shown, we have developed special high capacity belts for use with standard 100" or 120" belts for a maximum of 100 lbs. or 120 lbs. or 150 lbs. or 180 lbs. or 200 lbs. or 220 lbs. or 240 lbs. or 260 lbs. or 280 lbs. or 300 lbs. or 320 lbs. or 340 lbs. or 360 lbs. or 380 lbs. or 400 lbs. or 420 lbs. or 440 lbs. or 460 lbs. or 480 lbs. or 500 lbs. or 520 lbs. or 540 lbs. or 560 lbs. or 580 lbs. or 600 lbs. or 620 lbs. or 640 lbs. or 660 lbs. or 680 lbs. or 700 lbs. or 720 lbs. or 740 lbs. or 760 lbs. or 780 lbs. or 800 lbs. or 820 lbs. or 840 lbs. or 860 lbs. or 880 lbs. or 900 lbs. or 920 lbs. or 940 lbs. or 960 lbs. or 980 lbs. or 1000 lbs. or 1020 lbs. or 1040 lbs. or 1060 lbs. or 1080 lbs. or 1100 lbs. or 1120 lbs. or 1140 lbs. or 1160 lbs. or 1180 lbs. or 1200 lbs. or 1220 lbs. or 1240 lbs. or 1260 lbs. or 1280 lbs. or 1300 lbs. or 1320 lbs. or 1340 lbs. or 1360 lbs. or 1380 lbs. or 1400 lbs. or 1420 lbs. or 1440 lbs. or 1460 lbs. or 1480 lbs. or 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# SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

## REGISTRATION

Fill in this section 4 times. To receive complete information on a specific item, fill in 4 times.

Individual employment wanted or offering may be carried at above rate, payable in advance.

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NEW ADVERTISEMENTS received before 10:00 a.m. will appear in the issue mailed the following Friday subject to availability of space available.

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Flight  
Engineers  
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Truly exceptional opportunities await qualified engineers who are interested in Design and Development of Tension Rotor Helicopters. Long term program for both the Air Force and the Navy. Excellent working conditions.

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NEW and N.T.S.O.  
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## \$450.00 f.o.b.

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Specialized opportunities for qualified designers and engineers in the aircraft and aerospace field. Long term program for both the Air Force and the Navy. Excellent working conditions.

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## POSITION VACANT

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## POSITIONS WANTED

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## FOR SALE

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FOR SALE  
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## AIRCRAFT & ELECTRONIC EQUIPMENT

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## DOUGLAS PARTS and COMPONENTS

\$1,000,000 Inventory Of DC-3 Material

Maintenance And Inspection  
Overhaul Of Aircraft And Components

Technical Corporation  
Plastic Manufacturers

Sales And Service  
Storage

## AERODEX, Inc.

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International Airport  
Miami, Fla.

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WESTERN UNION "WUON" CABLE ADDRESS "GIDHATER"

## WHAT'S NEW

## New Books

"Rocket Propulsion Elements," by George P. Sutton, is a detailed survey of the fundamental elements and technical problems connected with this important field. Described are physical mechanisms and design of rocket motor systems. Mr. Sutton is supervisor of propulsion development for North American Aviation and draws upon first-hand experience with recent rocket developments.

In *Index* in the text are a method for calculating the theoretical performance a rocket can attain based on its combination of chemical fuels and oxidizing agents, plus performance data of the most important configurations, performance charts and tables, including several on properties of rockets at various temperatures, and a description of the technique, equipment, safety precautions, and instruments used in testing rocket motors. Published by John Wiley & Sons, Inc., 494 Fourth Ave., New York, 16, N. Y., 298 pages, price \$4.50.

"Therapeutic Air Cancer Certification and Operating Rules" is a document of the American Cancer Society, 1515 K Street, N.W., Washington, D.C. 20005. The results for complete operations. The document contains no new regulations promulgated by CAB since the original version was printed. Important among the changes are the provisions which bring certification of pilots for large aircraft and the operational use of the aircraft to a par with requirements for scheduled carriers. Subscribers to the document will be kept up to date on aviation rules. Send \$5.00 of your membership dues to: American Cancer Society, 1515 K Street, N.W., Washington, D.C. 20005. Postage Office, Washington 25, D.C., price \$1.00.

"Airplane Design," ninth edition, by Prof. Karl D. Wood, is a textbook aimed at engineering students on airplane layout and preliminary design calculations with emphasis on the economics of design. The author is head of the University of California's aeronautical engineering department. The design material presented is in accordance with the new FAR 23. Printed by the offset process, the book is profusely illustrated with charts, tables and diagrams. Distributed by the University Bookstore, Boulder, Col.

"Hitch Your Wagon," is Clayton Knight and Robert C. Durburn's long, sapid tale of colonial Beret Bolchica, framed pole-her included on her stones of Dak. Beret's team-athlete fight, the pole-episodes of Amundsen, Byrd, and Ellsworth, and heretics await sale.

of Balaban's adventures during the war. Publication date Dec. 15, by Dell Publishing Co., Drexel Hill, Pa., 375 pages, price \$3.99.

"The Gus Spotts Collection" is a grand description of papers and records collected by the former chief of staff of USAF during his career and turned over by him to the Library of Congress for preservation. The booklet is available free from publications section, Library of Congress, Washington 20540.

## New Literature

Belites #9000 on Line Material Co's Good for high intensity runway marker lights applied under GAA spec. 5-515 gives comprehensive description of unit's construction and application including bills of material and schematic and wiring diagrams for multiple and series circuits. Available by written request.

company as part of Acipet Lighting  
division, E. Stromberg, Free

**Chart on steel castings** is stated to be the verbally all-powred engineering types of steel castings classified as to include: drawings. Data include indicated engineering and design applications, current specs, and typical spots for essential grade requirements. Ready references give specific steel plant, clamping, reduction of stress, heat-treat and impact evaluation, endurance limits, modulus of elasticity, machinability, and types of heat treatment. With E. Konrad Donaldson, exec. v.p., Steel Foundries Society of America, 928 Midland Bldg., Cleveland 15, Ohio.

"Consolidated Revealing Oscillograph" is bulletin detailing multi-channel recording units, including sample records of applications and detailed assembly drawings. Write: Consolidated Engineering Corp., 523 N. Lake Ave., Pasadena 4, Calif.

## LETTERS

### A Whitaker Statement

The same represents George Gay Whitney and the Geo. W. Whitaker Co., Inc. We are sending reference to this notice on page 47 of our case file for your information. If you are not familiar, by note of a trademark, the allegations of the Don Co. to the effect that Whitney has illegally been writing and selling bathroom doors, including, Don patents and registered with Don trade marks without permission. The structure is the nature of a sign as to the one both of the Don Company and the United States District Court at Los Angeles.

However for more information George Gay Whitney and the Geo. W. Whitaker Co., Inc. have not been one of our case files.

The role whereby these defendants have been buying and selling of merchandise, the primary goal of which has been surplus monetization. Purchases are made in bulk into home mass retailers. We understand that most of the items originally were from West Africa. These statements are not facts in the fourth segment of the defendants in the Davis indictment.

We feel that the article mentioned has done an injustice to George Gay Whittaker and the Gay Whittaker Co., Inc. in that it is wrongly setting forth the true role of the various units, an undesirable impression is left with the reader as to the defendants.

Other publications, upon being placed at the start, decided to withhold publications until the defendants had had their day in court. While we did not request such action, we did ask that any be made of the demand of such adaptations, including the assertion that these defendants are in no way connected with any manufacturing enterprise in transaction a heavy fire has

George C. Wheeler and the Gay Whittaker Co., Inc. have been the subjects of some undesirable comments because of this article, and, unfortunately, have been damaged in the trade. We feel that the same measure of publicity should be given in the allegations of their enemy as was given in the allegations of the complaint, and that such news should also be given the same prominence in your magazine. This is a matter of fairness rather than one of latitude or morals.

WHISKER CHINE  
6511 Hollywood Blvd  
Hollywood 23, Calif.

(Aluminum Works has no record of having received any previous communication from Whisker in connection with this case.—  
E.S.)

### Expands Study

You may be interested in one of the results of the listing of my New York University thesis, "The Problems of Public Surveys and Plans as Related to Air Travel Advertising" in your "What's New" column, July 15, 1949.

As a result of this history, the thesis was called to the attention of executives of the Flight Safety Foundation and the Board of Governors of that organization have approved the thesis for publication.

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## Is Ethical Competition Too Dull?

What at *American Week* believe is competition. Even in the aviation magazine field.

Maybe it's naive these days but we also have the quaint idea that aviation publications can compete ethically. And we don't think sound business principles are any different in the publishing business than any where else. We somehow like to operate on the basic premise that the best editorial product plus the soundest and smartest sales program wins leadership. That's traditionally American.

So, that is why *American Week* considers its news and feature pages extremely valuable. They belong to you readers who are paying your good, hard-earned money for a subscription. That is why *American Week* doesn't run "pulls" and personal buildups, doesn't peddle for hours, isn't always demanding a free ride, and isn't going out of our way to nip at our competitors in print. We like to think we don't need to resort to such tactics, and that quality and facts speak for themselves.

It has been our observation that readers of aviation publications don't get much charge out of bickering between competing editors. They don't seem to be able to wind up much admiration for aviation editors who prostitute their space with innuendo at their competitors. That is one publishing formula, however, and it is none of our business how our competitors run their own shows if they think it pays off, and as long as they let us run ours. Our space belongs to you readers who most want to keep yourselves well informed on all the significant developments in aviation.

When *American Week* has something to say for itself, we say it on the editorial page, just like we are doing here. After all, this is the editor's page, and we are not going to think a lot of propaganda on you elsewhere. We even head over backward sometimes and put our letters on this page. We consciously believe that what we print is important and right, and not

propaganda for anyone. Furthermore, we admit our errors freely, but they are human and unintentional errors. And in this competitive business he who admits his errors runs great risk of unfair competition from those who do not freely admit theirs, or who are deliberately

Now why do we bring all of this up for discussion? Because unfortunately there is a tendency (it's definitely by a minority) in the aviation publishing field to grab the frequent nonethical and misleading references to other aviation publications, especially in any way which cast reflections on the competitor's accuracy and integrity. It is not uncommon in our own case, for example, to be quoted on things we never said, and which our discerning readers know we did not say!

We have never tried to berate our readers. We never underestimate their intelligence. We think that pretty much is recognized by our readers for what it is. Instead, we have found, are pretty good judges of publications. The fact that we have more of them, at twice the price, than any other aviation business magazine, seems pretty effective proof, even though our circulation has been held down for economic reasons to 10,000 ever since we started publication in 1947. And our advertising pages now total more each month than those of the next two magazines combined.

All of this discussion was brought on by one indignant individual who wanted to know if we were going to say so blatant ethical that our news and feature pages continued to ignore the sniping at our integrity. The answer at the moment is yes. We think readers are not so dumb. We think our rise to circulation and sales leadership in a little more than two years proves the aviation reader is plenty willing to sacrifice a little fireworks in his magazine for factual information. However, if our readers ever start advising us to stop taking this guff and to meet the slander with facts, incident by incident, we'll head off and let go.

ROBERT H. WOOD



**Capt. John W. Bennett**  
Operations Manager  
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